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CHEMICAL & METALLURGICAL ENGINEERING

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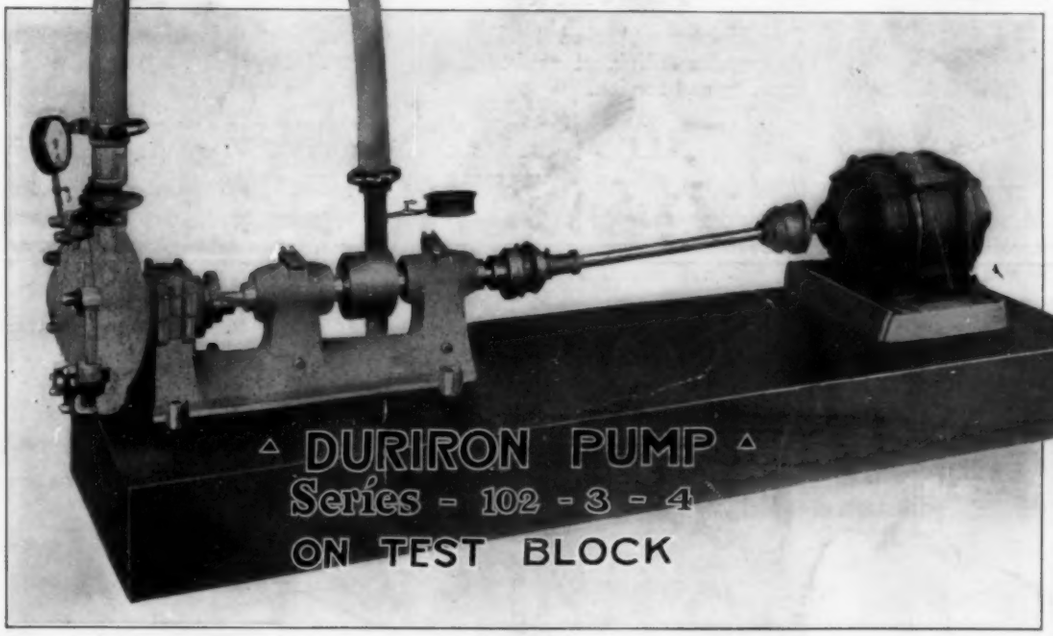

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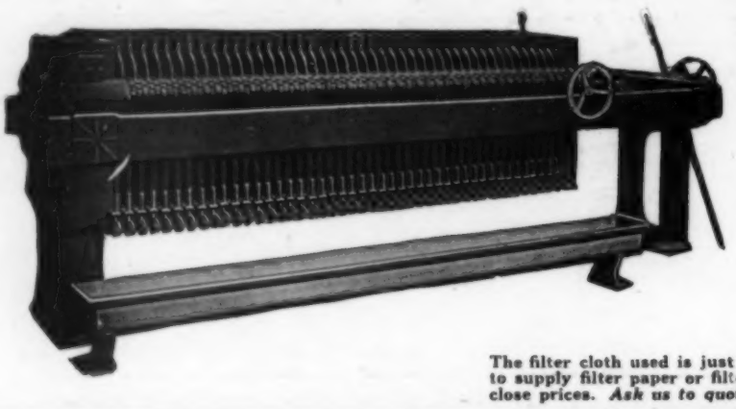

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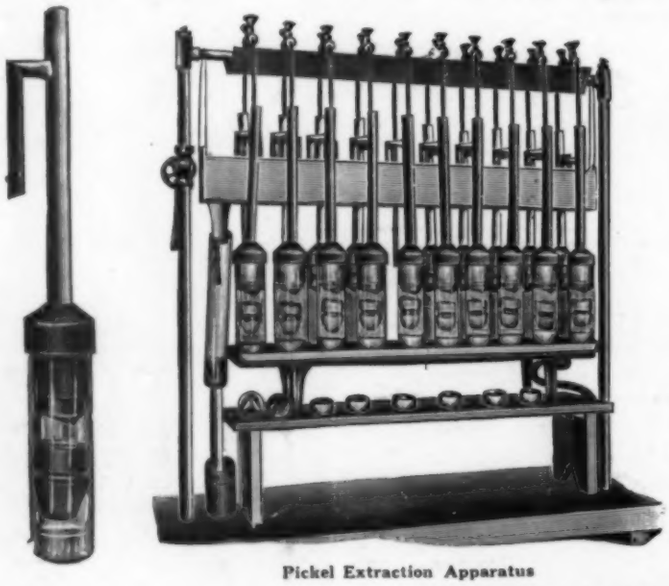

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The Chemical Exposition as An Adjunct to the College Course

TEACHERS of chemical engineering and industrial chemistry will find it worth while to make a special effort to bring their classes to the Chemical Exposition to be held in Grand Central Palace during the week of Sept. 11. As an educational adjunct it is doubtful if the Chemical Exposition can be surpassed, when one considers that in it are gathered together the products of the manufacturing brains of the industry. A few days at the Exposition under the intelligent guidance of an instructor, taking advantage of all the opportunities offered, should be equivalent to several industrial trips and plant visits.

By way of practical suggestion we offer the following: The students can be divided into groups and assigned to the study of exhibits of fundamental engineering equipment such as filters, evaporators, driers, etc., and required to make a written or verbal report for the benefit of the entire class. Lectures by specialists can be arranged in advance to be given by representatives of important exhibitors. Through the use of a stereopticon with reflectoscope attachment explanatory lectures can be given by the instructor based on the catalogs and other trade literature distributed at the Exposition. Meetings can be held for the discussion of new processes and equipment. Doubtless other means will suggest themselves for taking full advantage of the Exposition, but the principal thing is to take definite steps to get the students there in groups for two or three days. It is true that the Exposition is held just at the beginning of the school year, but it will well repay the effort to make use of it regardless of some slight inconvenience. Fortunately it is centrally located with respect to a great many colleges and universities.

Should Engineers Be Licensed?

IT IS DOUBTFUL if chemical engineers throughout the country are awake to the consequences of licensing laws that have been proposed or passed in many of the states. In fact it may be said that engineers of all classes were scarcely alive to the activities of a very energetic minority until bills had been passed affecting their right to practice. The unfortunate part of this lethargy is that whether he likes it or not, the engineer living in a state in which licensing is the custom comes under the terms of the law and finds himself restricted or hampered by incompetent legislation. The general attitude seems to have been one of *laissez-faire* in the thought that no particular harm could come from the licensing of engineers.

As a result of this attitude the movement has gone so far that many of those who are opposed to the policy feel that the most effective thing to do now is to guide and direct future legislation into the best channels. This is the view of the American Engineering Council. We think it is a grave question, however, whether any good can be accomplished from licensing engineers whose work requires the exercise of initiative, ingenuity, judgment or the creative faculties. It is conceivable that where the public safety and health are at stake licensing could accomplish some good. Thus engineers who are responsible for public works might be licensed with advantage to the community. But even this is questionable. The licensing system has not worked miracles with the medical profession. We still choose our physicians on recommendations other than those arising from the license to practice. So it is with chemical engineers, and we doubt not with many others. The stamp of state approval does not necessarily turn a poor engineer into a good one, and heaven knows plenty of poor engineers could get licenses.

New York is one of the states which has adopted the licensing system. The bill went into effect in April, 1921, and all engineers who are not licensed by April, 1923, will be subject to heavy fine if they attempt to practice. An examining board has been appointed to give examinations and issue licenses. We understand that the license entitles one to practice as an engineer without regard to the kind of engineering he is qualified to undertake. Being licensed, he may operate a chemical plant, design a skyscraper, build a bridge or lay out a system of sewerage! At least he is entitled to do these things as far as the license is concerned. It would certainly seem desirable to differentiate among engineers if they are to be licensed at all. But why license them? What do *Chem. & Met.* readers think about it from a chemical engineering viewpoint? We invite discussion.

Alas, Poor Potash, I Knew Him Well

ONE WEEK we get evidence of German pressure to eliminate the American potash producers, and the next week we receive manifestations that the American consumers of potash are very unfriendly toward the American industry. Now it is the National Fertilizer Association which objects to protection of the potash industry in this country. Every red blooded American, it says, would like to see the potash industry develop if it can be done along sound and permanent lines. Judging by subsequent sentences the sound and permanent lines seem to mean that American potash shall act as a kind of valet for the fertilizer industry and say "Yes, sir!" very loud whenever it is called.

If you object to American potash because it contains "too high a percentage of potash to obtain even distribution when used as fertilizer" and then object to it because the high freight rates in America militate against its use in potash consuming centers, you may still be consistent, despite the fact that the Panama

Canal makes cheap transportation possible from the producing points on the Pacific to the consuming centers on the Atlantic. But if the American potash were more dilute the freight would be higher. It looks as though the fertilizer industry wanted to have its potash cake and eat it too!

It is not strange that a consuming industry should object to protection for a producing industry. That happens all along the line. Textile manufacturers, in the opinion of some dye importing firms, object to adequate protection of dyes although they will protest vigorously if any reduction in the protection of textile goods is suggested. Similarly, some years ago the fight as to whether both zinc ore and spelter should be protected was bitter almost to the point of personal violence. As a country we do not seem to understand that when we start on a policy of protection all economically sound industries deserve like consideration. Protection of any industry inevitably must be paid for by the consumer. This is not an argument against protection, but it should invalidate the objection to a protective policy for any one article on that basis. We hold no more of a brief for potash than for any other American industry, but it seems that potash is about as hard pressed as any other chemical industry in an endeavor to stay alive. Therefore, if we stand in this country for protection, we should stand for protection of the potash industry, in which Americans have invested capital with the confidence that protection would be established. It seems to be only one more argument for a commission to determine and administer tariff rates in a manner analogous to that of the Interstate Commerce Commission. Such a commission will be non-partisan and expert. Some time this country will tire of the log-rolling, pork-barrel method of regulating vital industries. Speed the day! In the meantime the fertilizer industry ought to give fair and sympathetic consideration to the potash industry. If we read aright the trend in fertilizers, it is distinctly toward more concentrated products. Ultimately present methods will be abandoned and concentrated salts will come into their own. Foreign potash will not always hold the stage. Why not give a little thought to the next act on the program?

A Move to Kill Commercial Bribery

ON JUNE 1 the House of Representatives passed H. R. 10159, entitled "A Bill to Protect Interstate and Foreign Commerce Against Bribery and Other Corrupt Practices." This is the so-called commercial bribery bill. It is now in the hands of the Senate where favorable consideration is expected. The bill provides severe penalties for the payment of gratuities to employees for special favors: a fine of $3,000 or imprisonment for two years, or both. One of its questionable provisions is the granting of immunity to the person who first brings evidence of a particular illegal transaction. It is felt by many that this will lead to the development of a spy system and some concomitant evils. In spite of this the bill is generally considered to be a step in advance and one that should make considerable progress toward the elimination of a disgraceful commercial practice. This will be particularly true if prison sentences are imposed on 2 or 3 offenders. A fine would not be nearly as significant, but 2 years in prison would certainly be a strong deterrent.

The bill is not aimed solely or principally at the dye industry, although that is a well-known offender. But excellent as the bill might be in this case we believe there is a surer remedy. The dyer in a textile mill is an important workman. It is in his power to make or break the mill. If his dyeing is successful, the material will be first grade and consequently high-priced goods. On the other hand, if he makes a small slip the material is relegated to the class of "seconds" and the price of such goods is considerably less. Thirty years ago and earlier the dyer occupied the same position with respect to the industry, but the employer gave him a pretty niggardly wage, somewhere in the neighborhood of $10 to $15 a week. Now the offering of a small wage to men in positions of responsibility is the surest way to foster a system of dishonesty. At any rate the practice of bribing dyers developed and dyes even now are sold on a basis of friendship and bribery. There are some firms that don the white garment of purity with regard to this point and yet practice it surreptitiously, either by means of Christmas presents or through a friendly and unscrupulous broker. So much for the origin and practice of the system.

We understand that a scheme for eliminating the bribing of dyers in German textile works was successfully instituted by a large German dye house, not through any virtuous motive, but because it was cheaper than bribing. According to this plan the textile firm was to set a certain cost which it was willing to incur for dyeing its material. This was to include the price of dyes and chemicals, salaries of the dye force, the overhead and amortization fund. Then if the dyer was successful in turning out a minimum of "seconds" the firm would agree to pay the dyer, in addition to his salary, all that he could save under that minimum cost. In other words, if a dyer was to cut the dyeing cost from 15c. per piece to 12c. per piece the dyer would get that 3c. in the form of a bonus. This plan puts a premium on intelligence, energy and good results. It brings the aims and desires of the employee into harmony with those of the employer; and when this principle is achieved, bills to prevent commercial bribery are unnecessary and ridiculous.

Why Not a Performance Standard For Carbon Black Plants?

A YEAR ago the U. S. Geological Survey announced that six plants producing carbon black made in 1920 less than one pound of carbon per thousand cubic feet of gas consumed. About thirty other plants made between one and two pounds of carbon per thousand feet of gas. In the recent report for the year 1921 the Survey gives the encouraging statement that some companies have attained a yield of 3.5 pounds of carbon per thousand feet of gas, a 75 per cent increase in yield above the maximum the year before. However, there evidently are still a number of plants making less than one pound per thousand, for it is recorded in the preliminary data just announced that one plant made as little as 0.2 pounds!

Carbon black is made from natural gas by incomplete combustion of the gas under more or less definitely controlled conditions. The percentage recovery of carbon from the gas is usually between 2 and 3 per cent. The thermal efficiency of the process is perhaps 1 per cent. These facts show that the carbon-black industry as now practiced in the United States still has problems of great importance on the score of technical efficiency.

The carbon-black industry has for some time also been the object of legislation. It has had to migrate from one gas field to another partly to secure gas at minimum cost, but also in part seeking always to keep ahead of that enlightened public opinion which precludes use of gas for carbon-black manufacture when there is demand for the gas for public utility supply and household use. It is time now to inquire whether the basis of legislation should not be changed.

It would be absurd to try to legislate this industry out of business, for the product of the industry is of great industrial importance. The public does, however, have the right to demand that the industry shall not be unduly wasteful in its manufacturing methods. The industry can well ask itself whether those plants which make less than one pound of carbon per thousand feet of gas burned should not improve their yields or be prevented from operating longer. If this question can be answered satisfactorily, it is quite likely that the industry will do much to eliminate the cause for criticism which has existed in the minds of state officials.

It is, of course, not feasible overnight to change a plant from one making 0.2 pound to one making 3.5 pounds per thousand. Moreover, maximum yield cannot be had without some sacrifice of the quality of the carbon black made. But given time any plant can reasonably be expected to reach at least a minimum yield in pounds per thousand or it should be compelled to cease operations. This would be not only in the interest of the general public, which wants the gas efficiently used, but also in the interest of the industry itself, which inevitably suffers most from unnecessarily poor technology. The time may never come when all will equal what is now the best, but certainly all of those now far below the average can reasonably be brought up to that performance which a majority of the plants demonstrate to be commercially feasible without undue sacrifice of quality of product.

Basing Wages On Performance

PUBLIC OPINION regarding the relations between employers and employed has changed materially in recent years. The feeling is much more general that the employee should receive a just proportion of the profits arising from the combined services of labor and capital. At the same time sound economics teach us that the sum total of wages paid cannot exceed the value of the goods which are available to the workman without that divergence tending to advance prices through competitive buying.

Accordingly the subject has been developed to a point where it is made plain that if workmen as a group are to obtain more for their wages their production as a whole must be increased and the question is how that is to be accomplished.

This question, instead of involving "the division between labor and capital" about which we have heard so much, is really a question of division between different classes of workmen. We have seen various labor leaders claiming that certain incomes ought to be paid the particular classes of men they represent, usually calling the sum "a living wage" with frequent reference to an imaginary "American standard." It is hardly to be supposed that these labor leaders do not know that they are claiming for their men more than the reasonable share of those men in the total production. It is a safer assumption that they know, but that they are in competition and are simply trying to get all they can.

An important problem, then, is that of increasing the total production of goods and the rendering of service, and then of allocating to each workman his share, in proportion to what he contributes in work.

There has been ample opportunity for everyone to observe that men in different classes of employment are not equitably remunerated, one with another, in proportion to the quantity of work they do. The market values of the work might be equal without the intrinsic value being equal, market prices of work being fictitious on account of various influences, including, just for one instance, the accident of one labor union having been more assiduous than another in controlling the number of apprentices.

The human element is the great factor to be considered. For example, it is common knowledge that in certain lines of work, such as construction, men are to be found who are inclined to nurse the job along. They do not know whether there is going to be another contract after this one or not. On the other hand the man in the factory, whether making bolts or bricks or what-not, is likely to feel that the better he works the longer his job will last. The coal miner, again, belongs to the other category, feeling that there is only so much coal to be mined in a year, hence he wants a six-hour day or indulges in a strike of a few months' duration.

The difference is in the conditions of employment, which need to be modified so that this vicious tendency of nursing the job should be eliminated. The great divergences in the quantity of work done now by different classes of workmen could be brought out by an intelligent study of how much workmen in different callings really do in a day, carpenters, bricklayers, coal miners, sheet mill rollers, pick and shovel men, railroad workmen and all others.

Responsible to Economic As Well as Business Laws

IN DISCUSSING one of its railway wage decisions the U. S. Railway Labor Board made the following statement:

> The labor board has never adopted the theory that human labor is a commodity to be bought and sold upon the market, and consequently to be reduced to stagnation wages during periods of depression and unemployment. On the other hand, it is idle to contend that labor can be completely freed from the economic laws which likewise affect the earnings of capital.

Thus it appears that another judicial body recognizes that labor and labor organizations cannot be exempt from the normal operation of economic laws. No impartial consideration of the subject could reach another conclusion.

Organized labor has consistently urged that the increasing cost of living made necessary increase in wages, and that labor was entitled to take advantage of the shortage of man-power through the acceptance of higher wages, or the expectation of a bonus from employers. No one will deny these rights and privileges if labor will at the same time admit that with decreasing cost of living and deflation in the industry, the employer has an equal right to expect reasonable reduction in wages and cancellation of bonus payments that may have been necessary during times of unusual industrial activity. It will be a poor rule that works only one way.

Readers' Views and Comments

Efficiency of Carbon Black Plants

EDITOR'S NOTE: Mr. Bubb at our request commented on a preliminary draft of the editorial in this issue entitled "Why Not a Performance Standard for Carbon Black Plants?" The comment, which follows, is so valuable that we take pleasure in publishing it in full.

To the Editor of Chemical & Metallurgical Engineering

SIR:—I appreciate the opportunity to read your editorial. Your invitation to criticise it "vigorously" bespeaks a most commendable spirit of fairness. Except in a few points, I think your editorial admirable both in matter and manner.

Your argument that effort should be directed toward bringing all plants to the highest feasible standard of efficiency, instead of toward the destruction of an essential industry, is sound and convincing. Imperfections and inefficiency exist in most lines of manufacture. The remedy does not consist in suppressing the business or jailing the owner, but in devising more economical and efficient methods. But all legislation enacted, or attempted, against the carbon black industry has aimed, not to improve, but to destroy.

Three Criticisms Advanced

Three criticisms of your editorial occur to me.

WHOLE TRUTH NOT STATED ABOUT PERCENTAGE RECOVERY

1. In the first paragraph it is stated that "the percentage recovery of carbon from the gas is usually between 2 and 3 per cent." This is the truth, but not the whole truth. The inference is that the efficiency of the process is to be judged solely by the weight or volume of *carbon* recovered.

The element carbon is exceedingly common. It exists in many forms having a black color, such as coal, lignite, coke, animal and vegetable chars, graphite, gas-retort carbons, etc. These substances are black and are chiefly carbon, but they are very far from being "carbon black."

EFFICIENCY SHOULD BE JUDGED BY QUALITATIVE STANDARD

What is commercially called "carbon black" is a rather complex *pigment*, possessing certain remarkable properties—viz., unique brilliance and intensity of color, complete freedom from hard or gritty particles, unequaled minuteness of division, covering power when mingled with oil, and reinforcing power in rubber compounds. W. F. Weigand, the well-known rubber chemist, states that each cubic inch of carbon black contains 1,905,000 square inches (about one-third of an acre) of surface. The manufacturers' problem is not simply to dissociate the largest possible amount of carbon from hydrogen, but to make a uniform pigment possessing these unique properties, on which utility and value altogether depend. In other words, efficiency, as applied to this industry, must be judged by a qualitative more than a quantitative standard. Quantity alone means nothing.

Thus far no one has been able to attain the requisite intensity of color, fineness of particles and covering power except by collecting the smoke or soot of a hydrocarbon gas flame. Yield and quality seem to be inseparably related. The higher the grade of black desired the greater the volume of gas consumed per pound.

HIGH PERCENTAGE OF RECOVERY MEANS TOTALLY INEFFICIENT CARBON BLACK

Several years ago a well-known industrial chemist, decomposing gas under intense heat in a retort, in the presence of a catalyst, succeeded in obtaining from 8 to 10 lb. of carbon from a thousand cubic feet of gas. But the material was grayish, gritty, utterly deficient in color and tinctorial power—in short, lacking in the very properties which impart value and usefulness to the product employed to print books and newspapers, make carbon papers, reinforce rubber compounds, etc. From a quantitative standpoint the process had an efficiency of more than 30 per cent. From a qualitative standpoint it was 100 per cent inefficient, because nobody wanted or could use the resulting product.

BY-USES OVERLOOKED BY CRITICS

Critics of the present process also overlook several other facts. Of course the "natural-gas gasoline" is first extracted from the gas. Next, advantage is taken of the expansion of the gas to furnish motive power to run the factory. This is done by piping the gas at line pressure into the cylinders of a steam engine, where it is expanded, thus furnishing power without expense, except for lubricating oil. The process is continuous and automatic and from a mechanical standpoint exceedingly efficient and economical.

AS TO "ENLIGHTENED PUBLIC OPINION"

2. I do not think the statement that the industry "has had to migrate from one gas field to another seeking always to keep ahead of enlightened public opinion" is quite a fair presentation of the case.

The fact is that the carbon black makers try to obtain their raw material, natural gas, where it is cheapest and most abundant. This has led them to sell their gas as soon as markets are created in which it can be sold more profitably than it can be used in their own business, and to undertake the pioneer work of developing new gas fields. This has not been compulsory. On the contrary, neither Pennsylvania nor West Virginia, the states in which the industry has been longest established, has ever passed any law forbidding or in any way restricting it. And I am not sure whether an "enlightened public opinion" would condemn the use of natural gas for a product so essential to the enlightenment of public opinion as printer's ink.

There is much common sense in G. A. Burrell's recent article in the *Oil and Gas Journal* in which he says: "It is hard to see why printer's ink, tires, etc., do not add as much to the happiness and comfort of the people as the burning of natural gas for heat and light."

YIELD OF 3.5 LB. PER THOUSAND DOUBLED

3. One other statement in your editorial needs qualification—viz., that which says "some companies

have attained a yield of 3.5 lb. per thousand." Possibly this may be attainable. Certainly nobody has yet commercially attained so large a yield of a true carbon black, possessing the properties and range of utility above mentioned.

Factors Governing Yield

Passing to the questions asked in your letter, I would say that the yield depends largely on two factors: (1) The composition of the gas. (2) The quality of black desired.

Composition of the Gas

Actual experience of our company has proved that the *identical factory*, when removed to a new location and using leaner gas, may show a diminution in yield of as much as 30 per cent. This is of course due to the difference in the composition of the gas. The following analyses of gas from three different states will illustrate:

	No. 1 Per Cent	No. 2 Per Cent	No. 3 Per Cent
CH_4	80.5	94.12	46.45
C_2H_6	18.0	3.44	43.10
CO_2	0.0	0.40	0.96
N_2	1.5	2.40	9.49

A standard type factory, operating on No. 1 gas, averaged 1.4 lb. per thousand cubic feet. The same factory, removed to a new location, using No. 2 gas, produced only 0.9 lb. per thousand. A factory of the same type and design, similarly equipped and operated, yielded an average of 1.75 lb. from No. 3 gas.

It is also a well-attested fact that more black will be produced by the same factory in the same field as the field grows older. The reason is that the leaner and lighter gas comes off first.

Grade of Black Produced

I have already pointed out that the yield can be materially increased by sacrificing quality. It is also true that the highest grade gas blacks, such as are used for the best inks, finest lacquers and varnishes, etc., invariably require *several times as much gas per pound as the ordinary grades.* Undoubtedly the yield of only 0.2 lb. mentioned by the Geological Survey represents the results attained at a factory manufacturing high-grade blacks. These blacks are produced only in limited quantities, and command a price of from 35 cents to 45 cents per pound, as compared with from 8 cents to 12 cents for ordinary grades. In such a case, one unacquainted with the grading of blacks might draw a wholly erroneous inference from difference in yield, which is explained by the differences in quality of the product.

Some Comparisons on Losses

While we are on this subject of efficiency, at the risk of imposing on your patience, I should like to draw a few comparisons.

Distribution Loss in Gas for Domestic Use

When gas is distributed for domestic use there are losses all the way, in transmission, in distribution and in utilization. The U. S. Geological Survey states that in 1919 the total waste of natural gas in production and transmission was 58,943,631,000 cu.ft. Carbon black factories, located in the field, in immediate proximity to the wells, are virtually free from transmission and distribution losses. According to S. S. Wyer, where gas is produced and distributed to domestic consumers, the domestic consumer's actual utilization is 8 per cent, the total losses being 92 per cent. Tests made by the bureau of home economics of the Ohio State University on gas ranges, burning gas at 4 or 5 oz. pressure, show an efficiency of 13 per cent on the gas supplied to the burner, which would be equivalent to about 6.5 per cent on the gas drawn from the well.

Loss in Gas and Coal for Power Plants

Oliphant's data on use of gas under the boilers of an ordinary well-pumping steam engine give an efficiency of 2 per cent. I have also seen in the public press the statement attributed to Dr. Steinmetz that the efficiency of the lava-tip burner used for lighting is less than 0.5 per cent. In an article published last October in the *India Rubber Review*, W. F. Clark, a specialist in power plant engineering, states that out of one ton of coal in the ground the average recovery brings to the surface 1,400 lb., the power to operate the mine takes 100 lb., and the coal actually turned into work at the point of application in small plants is 76 lb.

Undoubtedly some of these losses could be avoided; undoubtedly they ought to be. But no one advocates prohibiting the use of gas ranges, lava-tip burners or gas-fired boilers.

Again to quote Mr. Burrell: "One of the chief arguments used against the carbon black industry by its opponents concerns the low yield as compared to the theoretical yield obtainable. One might as well decry the fact that in burning natural gas only about 5 to 20 per cent of the gas is converted into useful work."

Columbian Carbon Co.,
Williamsport, Pa. N. B. Bubb.

Ido, the New Universal Language

To the Editor of Chemical & Metallurgical Engineering

Sir:—In a recent issue of your paper I noticed a letter by G. W. Lee, of the Esperanto Association of North America, written in answer to one I wrote in regard to Ido.

I am sorry that I cannot agree with him regarding the status of Esperanto in Europe, but I cannot. The spread of Ido since the war is great, and Esperanto has met with some reverses. (Ido also has had its reverses.) But the superior qualities of Ido are gradually bringing it to the fore.

There are about sixty existing systems of an international language, very few of which are at all worth considering. Many of them have come into existence, as has Anglido, by being created by someone who disagrees with the various academies and societies that have charge of the propagation of the language.

Mr. Lee expressed the wish that I place Esperanto, Ido and Esperantida side by side and compare their relative merits. I am unable to do so with Esperantida, but I have done so with Esperanto and Ido. In fact I subscribe to a magazine published in both languages. And frankly, the difference between Esperanto and Ido is very great. In addition to the six special letters of Esperanto, its vocabulary is limited, and in order to express the thoughts that are wholly international one must often use makeshift expressions.

Now, I wish to make the following proposition to Mr. Lee, and I hope that he will accept. That the Esperantists, Idists and the proponents of all other language systems get together and form an "International Language Association of America." Such an

association would devote itself to the propagation of the idea of the international language. That such an association shall publish a journal, whose pages will be open to the proponents of all languages, the journal to have the principal articles published in Ido, Esperanto Romanal, etc. (that is, the principal short articles). The body of the magazine shall be devoted to articles in English, about the languages and shall contain the authentic world news of such languages. In fact, it shall serve as a clearing house for all systems, and shall enable the idea of the international language to permeate all places and enable all those who would desire to study the international language to judge for themselves the merits of the languages and to select that which most appeals to them. As a representative of Ido I speak. I shall welcome advances from Mr. Lee in regard to this matter, and I am confident that if we get together and work together the cause of the international language will not lose out. I am an Idist because I believe that Ido is the logical solution of the problem of the international language, but if the public shows that it wants some other language, then I shall be content to accept what the public wants or what some authoritative body may decide upon as an official international language.

Elyria, Ohio. EARL WALTER SUTTON.

Melting Losses in an Aluminum Furnace

In the notes on John A. Lange's paper "Melting Aluminum for Rolling Into Sheet," contained in the report of the Foundrymen's Association (*Chem. & Met. Eng.*, June 14, 1922, vol. 26, p. 1110) the furnace losses are shown ten times too large. When melting virgin metal 0.9 per cent was lost; clean mill scrap lost 1.6 per cent, and oily stamping scrap lost 3.1 per cent.

News of the Italian Chemical Industry

FROM OUR SPECIAL CORRESPONDENT

GENOA, June 5, 1922.

WITH the hope of encouraging research which will result in substantial progress for the Italian chemical industry, the Associazione Chimica Industriale, of Turin, has arranged for a prize competition in which 5,000 lire has been offered for the best scheme proposed for the utilization of some chemical waste product, or for the new use of some chemical already known. The Federazione Fabbricanti Acidi and the firm of Stabilimento Ing. A. Vitale of Rumianca have also offered a prize of 3,000 lire for the most practical new use suggested for sulphuric acid. A similar prize is also offered by the chlorine producers. It is generally well known that, as a result of the war, considerable excessive manufacturing capacity exists in both of these industries. Since the Armistice, many firms have had to reduce their production on account of the large unsold stocks which had accumulated. The situation has been further complicated by the crisis in other Italian industries. Italy ordinarily produces more sulphuric acid than is consumed and therefore boasts of a modest export trade in this commodity. The production in 1918 reached the total of 835,440 tons. During the past year, imports have been practically nil, while exports amounted to 576 tons, of which quantity Switzerland received 328 tons and Egypt 14 tons.

The demand for superphosphates was scant during May although the imports of mineral phosphates continued at their usual rate. Consumption of this commodity is somewhat seasonable and the works are looking forward generally to good business later. Cyanamide is in demand, especially in some regions where its use has become rather thoroughly established. The demand for nitrate of soda and copper sulphate is also unusually good for this season. In the case of the latter commodity, the independent producers have had to meet the competition of plants which were working on contracts from the co-operative agricultural federations, prominent among which is the Società Anonima Vercellese Industria Solfato "Avis," with a capital of 2,000,000 lire.

The continued difficulties in the sulphur industry have resulted in the closing of many of the Sicilian mines, thus throwing thousands of operatives out of employment. In the hope of bettering this situation, a law has been proposed in Rome authorizing the Consorzio Solfifero Siciliano to issue obligations to the extent of 100,000,000 lire, and also requiring that a cash concession of 13,000,000 lire be paid to the same institution by the Bank of Sicily.

The production of Sicilian sulphur in 1921, according to Consul Edward T. Nathan at Palermo, amounted to 240,049 tons, or practically the same as in 1920, of which 80,000 to 90,000 tons are consumed annually in Italy. The exportation amounted to only 105,063 tons in 1921 while 188,868 tons were exported in 1920. As a result the stocks at the various mines on Dec. 31, 1921 were approximately 273,579 tons, as compared with 147,886 at the close of the preceding year.

At a meeting of delegates of the sulphur consortium and more than 200 sulphur-mine owners, held on April 27 at Palermo, resolutions were passed disclaiming acquiescence in the failure of the Government to grant the provisions requested, and the resignation of the consortium council was tendered. The crisis in the sulphur industry is due to the high cost of production, wages representing about 50 per cent which, combined with costly methods of extracting and refining, has led to a decline in exports through the inability of the producers to meet competition. As a result most of the Sicilian mines are either shut down or working on part time.

PETROLEUM RESOURCES

Among the important events of the past month was the signing of a commercial agreement between Italy and Russia, whereby the former country is to obtain extensive supplies of petroleum, coal and mineral oils. Some effort has also been exerted toward reaching an agreement with Rumania for the purpose of securing the free exportation of their crude oil which will be treated in the refineries at Trieste. It has also been announced recently that several new sources of petroleum have been discovered in Italy, at San Giovanni Incarico and at Ripi.

With the annexation of the Terento and Istrian regions, Italy came into the possession of the Idria mercury mines, which are third in importance as compared with the other mines of the world. In these mines, free cinabar is found in calcareous dolomites and occasionally in the carboniferous layers. The different minerals contain from 0.5 to 50 per cent of mercury. The yields of the mercury mines during 1920 were but 460 kilos per workman against 718 kilos in 1918. It is not known at this time whether this lower output is due to the depreciation of the deposits or to less intensive exploitation by the operatives.

British Chemical Industries

FROM OUR LONDON CORRESPONDENT

LONDON, June 15, 1922.

IT IS pleasant to be able to record a further improvement in business for nearly all classes of products, although there have been no important changes in market prices. Both for home and export chemicals are in good inquiry, and even in dye intermediates there is every prospect of improving demand. The end of the engineers' lock-out, the reduction in the bank rate and other factors have done much to restore confidence, and in financial as well as in trade circles there is talk of a minature boom before the close of the year. The engineering dispute has done far more damage to the chemical industry than is generally realized and in seriously reducing coke-oven output, sulphate of ammonia production as well as the trade in basic slag has been affected. On the other hand, heavy chemicals continue to do well and caustic soda, for instance, has been shipped in quantity to the Continent. There has also been a material increase in the quantity of Scotch coal shipped to Germany.

CRITICAL DAYS FOR THE DYESTUFFS INDUSTRY

"Of making books there is no end and too much learning is a weariness to the flesh" is a quotation in which "dyestuffs" might well be substituted for "books." The trials and tribulations of the manufacturer have been ventilated *ad nauseam* and the idea that the British Dyestuffs Corporation is negotiating with the German I. G. to impart its "secrets" seems almost the last straw. Whether this is partly the reason for Dr. Levinstein's offer to resign from the board of directors in order to express his dissent from their technical policy is a matter of conjecture. The *Times*, however, has really surpassed itself by a journalistic brainwave which recommends the handing over of the required information as partial satisfaction of reparations payments! Actually the Germans are inclined to treat with some concern the progress made in the British dyestuffs industry, and the prices paid for dyes made abroad are not considered prohibitive by users. It seems doubtful whether an arrangement similar to that made with France would be tolerated, and public opinion is on the whole determined that the country shall not slip back into its pre-war dependence on foreign countries. The annual meeting of the British Dyestuffs Corporation will be held next week and may throw some further light on these vexed questions. During the current year there has been a loss in trading of about $4,500,000, mainly on account of drastic writing down of stocks to correspond to current prices.

FURTHER DEVELOPMENTS AND NEW PROCESSES

The Brondse process for oxidizing, browning and coloring iron, steel and non-ferrous metal articles is likely to find extensive applications. The ordinary methods involve heat-treatment or chemical action for prolonged periods, whereas the process under review is an electrolytic one requiring a few minutes' treatment only in simple apparatus, and giving a variety of colors and finishes varying from brass and copper to shiny black. Accurate parts such as micrometers and gages can also be treated, as there is neither corrosion nor increase in size and it is unnecessary to remove rust as it is automatically removed in the process. It would seem that a hard coating of magnetic oxide of iron is actually deposited at a very low cost, and being extremely resistant to chemical action as well as to mechanical abrasion, the process should find increasing application in the chemical industry. Some well-known experts have been retained for the technical development of the Plauson colloid mill in this country, and among more recent applications the use of suspensions of bitumen and asphalt in water is indicated as a promising substitute for the present method of covering roads with the hot molten product. The use of titanium oxide as a paint material is also attracting attention and the Norwegian product has been found satisfactory in admixture with about three parts of barium sulphate and also in suitable proportions with other compounds. Sir George Beilby, director of the Fuel Research Station, recently delivered an address on his researches on the structure of coke, and these, together with the information contained in the report on low-temperature carbonization just issued, are considered to be of the greatest importance. Beilby was able to produce coke of an apparent density of 1.33, of which the internal reactive surface is quite equal to that of wood charcoal of half the density. The station is carrying out further investigations in regard to automatic carbonization, briquetting before carbonization and improved means for increasing the strength of briquets.

BRITISH CELLULOSE WRITES DOWN ITS CAPITAL

Drastic action in this case was, as foreshadowed in these notes, almost inevitable, but the formation of a holding company which takes over the Cellulose company's power station and a large slice of the debentures and preference shares in return for financial assistance has not been regarded as a favorable arrangement. The government and the preference shareholders are the chief sufferers, and it remains to be seen whether the reconstruction, together with the promised Swiss technical assistance, will enable the company to manufacture marketable products profitably, or whether further drastic steps will become necessary.

GENERAL NEWS AND NOTES

The annual meeting of the Society of Chemical Industry will be held in Glasgow early in July and Dr. Ruttan, Dr. Ellwood Hendrick and other visitors will receive a very hearty welcome both there and in London. Dr. Ruttan is to address the Chemical Engineering Group and the Chemical Industry Club on "The Training of the Chemical Engineer," and the Institution of Chemical Engineers, which was brilliantly inaugurated on May 2, will be well represented. The Institution is working in close co-operation with the American Institute, but is meeting with the usual difficulties in regard to its relationship and co-ordination with other qualifying bodies such as the Institute of Chemistry and the Institution of Civil Engineers.

The chemical ingredients of gas mantles are now subject to duty under the safeguarding of industries act and a further duty is now suggested under part 2 (dumping and depreciated currency) of the act. The inquiry has been adjourned to enable the German trade association to be represented, a procedure for which there is no precedent and which has occasioned considerable surprise.

Sir T. H. Holland is the new rector of the Imperial College of Science and Technology in succession to Sir Alfred Keogh.

Niagara Falls Meeting of the American Institute of Chemical Engineers

Strong Technical Program, Interesting Excursions, Pleasant Entertainment Features and Scenic Beauty of Niagara Combined to Make Meeting a Great Success —Next Meeting Possibly at Richmond, Virginia

NIAGARA FALLS in now just such another joyful memory for the American Institute of Chemical Engineers as is Baltimore, Detroit, Savannah, Boston, New Orleans and so on back with half-yearly jumps until even the secretary, Dr. Olsen, becomes a little vague as to where the Institute convened. Niagara Falls was a happy choice of place, with the thrilling cataract—a kind of symbol of America—as a background and its vicinity alive with industries which allure the chemical engineer. It was a characteristic convention—stimulating, vigorous, live. If you ask a member of the Institute why he goes to the meetings he will give you any one of a score of reasons; the papers, the discussions, the industrial excursions, the meeting with other men in the profession, etc. But whatever the reason, twice a year about 20 per cent of the total membership of the Institute convenes, so there must be something in it.

The cub reporter had a memorable time which began when he pinned the blue badge on his lapel and ended when he left the Shredded Wheat factory four days later in a dash to catch the Buffalo train. It will be a long time before any of us forget the little page with a hundred silver buttons on his coat and the booming bass voice—"Call for Mister Reese." The asthmatic bus in Toronto which took thirty of us out toward Eastman's kodak factory is another memory. It broke down five times and finally died half a mile from the plant. Nor will we forget the enthusiastic songfest that was staged by the second carload coming back from Buffalo to the Falls. Led by Mr. de Beers and encouraged by the example of Messrs. Marshall, Stokes, Tunison and Richter, there was almost collegiate harmony throughout the trip.

Still another episode is remarkable. A new kind of game was developed by part of the crowd which went to see the Hydro-Electric power plant. It requires seventeen automobiles filled with people, all bound for a definite point. None of the people in the cars must know the location of the destination. A leader is chosen who starts off on what he believes to be the worst road in the vicinity—not necessarily in the direction of the destination. When the road becomes good, the leader is deposed and another leader elected who knows a worse road. A broken spring counts 10 points and "a good time may be had by all." By a process of elimination the destination is reached—and the Hydro-Electric plant was magnificent.

The local committee is to be congratulated upon the arrangement and plans which were excellently conceived. G. Prescott Fuller was chairman of the Niagara Falls committee and was assisted by Messrs. Lyster, Kellogg, Mauran, Lidbury, Tone, Snowden and Sergeant. An especial palm should be added to the decoration of the Buffalo committee, composed of Mr. C. B. Morey, chairman, and Messrs. Rippel, Howard, White, Spalding, Kerr and Heritage. The Buffalo program moved with even greater smoothness, if that is possible. The ladies were entertained by a committee headed by Mrs. A. H. Hooker and Mrs. C. B. Morey. Below is given in condensed form the program which was carried out as originally planned.

MONDAY, JUNE 19, 1922

8:00 a.m. Registration, Hotel Clifton, Niagara Falls, Ont.
9:30 a.m. Reading of Papers.
1:30 p.m. Luncheon at Hotel Clifton.
2:15 p.m. Automobile trip through Niagara Falls, Ontario, including inspection of Niagara Falls plant of Hydroelectric Commission and new power canal.
8:00 p.m. Public Lecture at Hotel Clifton.
"Geology of the Niagara district," by John Jackson, superintendent of the Queen Victoria Park at Niagara Falls, Ont.
"Niagara Power Development," by John L. Harper, Chief Engineer of the Niagara Falls Power Co.

TUESDAY, JUNE 20, 1922

8:10 a.m. Special cars for Queenston via gorge route, Canadian side.
9:00 a.m. Boat for Toronto.
9:15 a.m. Business session on boat.
12:30 a.m. Luncheon on boat.
1:00 p.m. Arrive in Toronto.

1. Visit to Kodak factory and automobile sightseeing through the city.
2. Visit to plant of the Consumers Gas Co. and rubber factory, followed by automobile trip through the suburbs.
3. Automobile sightseeing trip through the city.

5:45 p.m. Boat for Lewiston.
6:00 p.m. Dinner on Boat.
8:30 p.m. Arrive in Lewiston; special cars for Niagara Falls via gorge route, American side.

WEDNESDAY, JUNE 21, 1922

8:00 a.m. Special cars for Buffalo leaving Hotel Clifton.
10:15 a.m. Meeting at Hotel Lafayette. Papers.
1:00 p.m. Luncheon, Hotel Lafayette.
2:15 p.m. Automobile trip around Buffalo. Opportunity was afforded for visits to the following plants: Lackawanna Steel Co.; Wickwire Steel Co.; Buffalo General Electric Co., Steam Power Plant; Dold Packing Co. and Larkin Company.
8:00 p.m. Smoker, Hotel Lafayette.
10:30 p.m. Special cars for Niagara Falls.

THURSDAY, JUNE 22, 1922

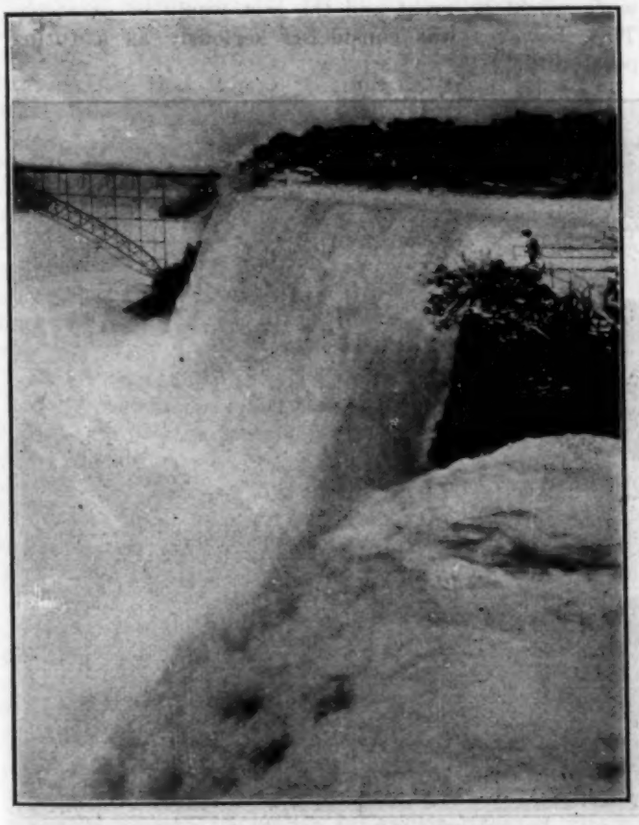
9:30 a.m. Meeting at Hotel Clifton. Papers.
1:00 p.m. Luncheon at Hotel Clifton.
2:15 p.m. Automobile trip, Niagara Falls, N. Y. Optional trips to the following: Hooker Electrochemical Co.; Niagara Falls Power Co.; Niagara Wall Paper Co.; Kimberly-Clark Paper Co. and Shredded Wheat Co.
4:30 p.m. Tea at Niagara Falls Country Club.

Visit to the Ontario Hydro-Electric Power Commission

On Monday afternoon the members took an automobile trip to see the famous cut and power station of the Ontario Hydro-Electric Commission. Water is taken from a point above the first rapids and delivered at a point below the whirlpool where the level is that of Lake Ontario. This gives a maximum drop of 315 ft. —over 150 ft. higher than the drop obtained by the power companies at the Falls. In order to accomplish this it was necessary to dig a very deep canal, 35 ft. of which is lined with concrete. It winds through the country in a rough semi-circle for a total length of 13 miles. The excavation work is prodigious and has been fully completed. The power house is now under construction, although two 55,000-hp. turbines have been installed and are now operating. Each turbine is fed by a 15-ft. diameter standpipe. The ultimate plan calls for nine such installations, the largest in the world, the total expenditure for which will be in the neighborhood of $70,000,000. The engineering is on a vast scale and it is an exceedingly impressive sight.

Public Lectures on the Niagara Gorge and Power from the Falls

That evening two public lectures were given, the first by John Jackson, superintendent of the Queen Victoria Park at Niagara Falls, Ontario, on the subject, "The Geology of the Niagara District." He traced the history of the Niagara gorge and showed the reasons for the narrowing and widening of the gorge at various geological periods. The two narrow parts of the gorge were undoubtedly caused by the fact that Lake Huron had another outlet to the east which drained a great deal of the water formerly going over the Falls. At these two periods in the geological history of the gorge there was undoubtedly somewhat less than 20 per cent of the water going over the Falls than at present. At other times, due to a rise in the land, the Falls were almost as large as they are now.



THE POWER OF THE FALLS

John L. Harper, chief engineer of the Niagara Falls Power Co., spoke next on Niagara power development. Mr. Harper's talk was most enjoyable and he developed a number of interesting points. He showed by statistics that at least twice as much water could be withdrawn from the Falls as is now being used and still have the scenic effect improved, if anything, over its present condition. His suggestion was that islands be constructed at appropriate points in the Canadian gorge to distribute the water over there. The Falls would then resemble more the effect produced by the American Falls, an accomplishment which should be perfectly practical, he said. At the present time, about 20 per cent of the water which normally would go over the Falls, is being used industrially. Another 20 per cent could easily be extracted without materially damaging the scenic wonder. Mr. Harper told of the new turbines which have been recently contracted for by the Niagara Falls Power Co. of a size even larger than those now installed by the Hydro-Electric Power Commission of Ontario. Each unit will have 70,000 hp. capacity. Splendid photographs and moving pictures of the Falls were shown by the lecturer.

The Toronto Trip

The trip on Tuesday to Toronto by way of Queenston and the boat on Lake Ontario was most enjoyable. The day was perfect and the sail across the lake a great treat. The inspection of the city of Toronto and of its various industrial plants was also interesting. Many expressed great surprise that Toronto was such a tremendous city, the reported population being over 700,000. The boat trip back landed us at Lewiston, on the American side, and we took the famous gorge trip along the Niagara River at the foot of the great cliff. The great volume of water which goes over the Falls is more evidenced in the gorge than anywhere else. The swirl is very impressive and mountains of water pile up in almost terrifying heights.

Industrial Buffalo and an Air Trip

Wednesday took us to Buffalo, where a number of very large industries opened their doors to us. Five separate trips were conducted to the Lackawanna Steel Co., the Wickwire Steel Wire Plant, the Dolt Packing Co., the Buffalo Steam Power Plant and the Larkin Co. In addition three members of the Institute went up in an airplane and saw Buffalo from the air. This opens up a new possibility. Show visitors the city by using the air route. Each of the Institute members expressed great enthusiasm for the air route and remarked on the unusual and complete perspective which can be obtained in the air.

After the industrial visits, a tour of the city was made by automobile, the residential part of Buffalo being unusually beautiful on account of the many trees.

In the evening a very enjoyable smoker was held at the Hotel Lafayette. The Institute opens its doors at its meetings on its plant trips, and in its business sessions, but its smokers must be a fraternal secret. Besides it would be wise on our part to refrain from comment because of the possibility of domestic difficulties among the members if it became known that the performers at the cabaret were extremely good looking.

A unanimous and enthusiastic vote of thanks was passed to the committee in charge of the smoker.

The meeting closed on Thursday with an inspection of some of Niagara Fall's industries. Of course, it was not unexpected that the industries at the Falls were in general unwilling to open their doors. Many of the industries depend for their very life on the secrecy of their processes and they will all do everything for visitors except show them the inside of their manufacturing plants. Tea at the Niagara Falls Country Club was tendered the members as a parting function by the local committee.

Important Business Transacted

The business meetings of the American Institute of Chemical Engineers are always worth-while. The Institute is a leader in so many activities that the questions discussed are always vital and pertinent to the chemical engineer whether he be a member of the Institute or not. Records of previous meetings were approved and an extensive report of the Council meetings was made. Among the subjects discussed at the Council meetings were local sections of the American Institute of Chemical Engineers. Provision was made for such a local section where there were over ten members in a city. Meetings were to be held four times annually and close contact maintained with the national body. In some cities there would obviously be a call for such an organization and in other cities it would be somewhat superfluous.

Appropriate resolutions were adopted by the council upon the death of three members, A. W. Ayer, William C. Carnell and Charles Baskerville.

Finally, the council has outlined a program of co-operation with the Institution of Chemical Engineers, the newly formed British body. The suggested basis of co-operation was first, to print the names and addresses of both societies in the membership list of each society. Second, to grant all privileges to members of either society in the other society, except the privilege of voting at meetings. Third, to send a copy of all bulletins issued by the society to the secretary of the other society, so that he might make the proper disposal of it and bring it to the attention of his members if it was important. Fourth, to make publications available to members of both societies at cost price. It was voted to donate a complete set of the transactions of the American Institute of Chemical Engineers to the Institute of Chemical Engineers.

The secretary reported that 27 active members and 4 junior members had been elected during the past six months, bringing the total membership to 1 honorary, 440 active and 104 junior members.

The Committee on Patents reported that the Lambert bill carrying with it half a million dollars additional appropriation for the patent office, had been passed and that the committee on patents of the Institute had worked with the National Research Council patent committee in furthering this bill. It was also announced that President Howard had been instrumental in inserting a working clause into the patent bill whereby it becomes necessary for a patent to be worked in this country inside of two years or it is declared invalid. This is in the interests of American industry so that foreign companies cannot take out patents in this country and hinder American manufacturers.

Engineering Abstracts

The committee on engineering abstracts told of the conferences with E. J. Crane, editor of *Chemical Abstracts*, one of the journals of the American Chemical Society. Mr. Crane has volunteered to give more space to patents and engineering articles. The committee recommended that better abstractors of engineering articles and patents volunteer to undertake this work. At the present time it is wholly unfeasible to publish an engineering abstract journal. The duplication in work would be great and the cost would be excessive. This, however was considered seriously as a future possibility.

VIEW OF THE FALLS FROM THE AIR, HOTEL CLIFTON IN THE FOREGROUND

The place for the next meeting was discussed at some length and the secretary was instructed to discover the points of interest of Richmond, Va., as an industrial center. If favorably considered, the council was empowered to decide upon it as the meeting place.

A committee was appointed to co-operate with the American Institute of Mining Engineers in regard to the licensing of engineers in New York State. Successful opposition to the licensing of chemical engineers has been carried out in Massachusetts and in Ohio. It seemed to be the sentiment of the meeting to oppose the licensing plan.

Chemical Engineering Education

Perhaps the most important subject discussed at the meeting was the subject of chemical engineering education. The council reported that a conference on the report of the Institute committee on education between the colleges and the technical men in industry had been called in Brooklyn in May and that this conference had been extremely successful. After considerable discussion it was voted to appoint a committee of eleven, all members of the Institute, composed of six technologists and five educators to carry out the details of the report. The thirteen points adopted by the conference in Brooklyn leave a great deal of detail work to be completed, such as the standardization of nomenclature and the proper weighting of courses.

It was suggested and enthusiastically endorsed as a function of this committee, that after due deliberation it should aim to differentiate good and bad chemical engineering courses and approve the courses in institutions which were of the proper standard. In this way the general tone of chemical engineering education could be more effectively improved than in any other way. This is the same function which the American Medical Association has adopted and it has practically completely eliminated the fly-by-night medical schools. It was the general sentiment of the meeting that the work of this committee would be watched with great interest and that it was possibly the most important work the Institute has in hand.

Technical Papers Presented

The first paper was presented by Peter S. Gilchrist and was entitled "Modern Methods of Concentrating Sulphuric Acid, Including Concentration of Sludge Acid and Acidproof Masonry Construction." This paper appeared in the June 24 issue of *Chemical and Metallurgical Engineering* to which you are herewith referred.

L. A. Thiele's paper on "Increased Capacity of Cascade Systems" describes a special corrugated bottom cascade basin through which the acid travels in a wave-like motion. Such a basin has an effective heating surface equivalent to 3 times that of a basin without corrugation and this gives greatly increased heating capacity. A string of 50 of these basins produced from 16 to 18 tons of 93 per cent acid. The basin is patented under U. S. Patent 1,380,689. Application of the same principle to a still was shown, this being used in the production of gasoline, oils, fats, greases and in the recovery of volatile solvents. A still 3-ft. 6-in. in diameter and 9-ft. long was shown to contain 150-sq.ft. of effective heating surface and to have a capacity of 2,500 gal. of gasoline per hour.

An abstract of a paper by L. J. Michael and J. R. Withrow on the "Solubility of Quartz Packing in the Glover Tower," outlined very briefly some work which had been done on this problem. Careful calculations seem to indicate the impossibility of explaining the contraction in the Glover tower packing as being due to the solubility of silica in acid. It was probably due to the fact that the Glover tower had been allowed at various times to cool off and then had been reheated. The unequal contraction and expansion resulted in a rearrangement of the packing and an apparent loss. The discussion which followed this paper seemed to confirm this point of view.

Cifford B. Carpenter read a paper on "Concentrating Dilute Nitric Acid Solutions" by himself and Joseph Babor. He apologized at first for the errors which had appeared in an article by him published in *Chemical and Metallurgical Engineering* last February,[1] due to the fact that the standard succinic acid solution used had been found to be inaccurate. The work had been repeated and the revised result will be published in an early issue of *Chemical and Metallurgical Engineering*. From the data which is presented in this paper it will be possible to predict the fractionating column which will be necessary to produce a given result. The paper aroused much favorable remark and F. C. Zeisberg, of the du Pont company, who has done considerable work along this line, expressed his commendation of this work.

Mr. Zeisberg then read a paper on "The Thermal Considerations of Sulphuric Acid Concentration." This article appears in this number of *Chemical and Metallurgical Engineering* and therefore no abstract will be necessary.

P. J. O'Gara Discusses Sulphur Dioxide and Fume Problems

The Institute was extremely fortunate in hearing P. J. O'Gara discuss the nine years of research which have been carried out under his direction for the American Smelting & Refining Co. The research is of the most comprehensive nature and was designed to study the effect of sulphur dioxide and other fumes on vegetation. Dr. O'Gara himself is a plant physiologist and not a chemist but his handling of the chemical problems which developed in the course of the research was always deft. He first discussed the various types of fume cabinets and showed the various objections to them. His own cabinet, which has been critically examined by every man in that field, was the result of overcoming the difficulties in the earlier cabinet and now can be assumed to be almost an ideal cabinet for this kind of work. Troubles with the earlier cabinets were due to the lack of circulation, the disregarding of the humidity, light and other conditions, the unknown absorption of SO_2 by plants and consequent variation in the gas concentration in various parts of the cabinet, etc.

Dr. O'Gara's experiments were carried out in the field on growing crops. Extensive and very complete records were kept of all experimental work, accurate analyses of the gas used was made, light conditions and humidity conditions were recorded. The conclusions reached are extensive and valuable and it is our privilege to announce that Dr. O'Gara's work will appear in subsequent issues of *Chemical and Metallurgical Engineering*. A great deal of valuable data have been obtained from a purely scientific standpoint and a unique amount of information has been gathered on crop injury and on

[1] *Chem. & Met. Eng.*, vol. 26, No. 10, March 8, 1922, p. 443.

the cure for such injury. The relation of stack height to crop injury has been studied carefully as has been the effect of solid fumes on the soil.

Considerable success has been obtained by the use of the Cottrell system in eliminating fumes. There was a great deal of trouble early in the use of the Cottrell process because basic fumes could not be handled and it was found necessary to acidify them with a certain amount of sulphuric acid. This has been found to be considerably cheaper than the old baghouse method of separating fumes.

New Hydrochloric Acid Absorbers

S. L. Tyler presented a paper describing a new form of absorber for hydrochloric acid. In essence it consists of an elongated and flattened S-bend with a trough in the bottom so that the gas passes over a shallow pool of ever changing liquid. A certain amount of acid is obtained by inclining the roof of the chamber toward the center from which the condensed acid will drop. By joining two or three or four of these units together a very effective absorption system is obtained. It embodies nearly every advantageous principle in the absorption of gas by liquid. A great deal of interest was expressed by producers of HCl in this apparatus which is made of quartz. The paper is an important one and will be published in *Chemical and Metallurgical Engineering* within a few weeks.

H. S. Taylor read a paper on "The Manufacture of Hydrogen and Nitrogen for Synthetic Ammonia." He pointed out a very significant fact—that about 75 per cent of the publicity had been devoted to the actual production of synthetic ammonia, whereas nearly 75 per cent of the cost of the ammonia was tied up in the hydrogen and nitrogen production. Dr. Taylor summarized all the processes by which nitrogen and hydrogen are usually made on a commercial scale and pointed out the economic reasons why the various processes were unsuccessful or successful. Most of the gas is produced by the water gas process. This, as it has been worked out, is fairly efficient and will produce one volume of hydrogen for every 1½ volumes of water gas made.

That particular gas ratio is the crux of the whole problem. If this ratio is high, the cost goes up proportionately because more coal is used. Dr. Taylor expressed some hope that the steam-iron contact process which gives hydrogen of very great purity, would be developed and indicated that Richardson's work was suggestive that this was entirely possible. Electrolytic hydrogen as a competitor of either of these other processes would have to have very cheap power and a much better cell of very high amperage before it could be a legitimate competitor. Dr. Taylor felt that it would not be feasible to use byproduct hydrogen in ammonia synthesis since it was extremely likely that ammonia synthesis would have to be carried out in very large units to be utlimately successful and that any byproduct hydrogen would be a very small drop in the bucket in a large unit.

A paper on "Some Economic Aspects of Ammonia Oxidation" by G. B. Taylor was read by F. C. Zeisberg, his colleague. This paper appeared in *Chemical and Metallurgical Engineering* for June 28[1] and it will be unnecessary to abstract it further.

Another paper presented by H. K. Moore of the Brown Co. and read by G. A. Richter, discussed the production of hydrochloric acid by direct union of hydrogen and chlorine. The paper was presented in abstract only and was extremely suggestive of the possible use of this method. Mr. Richter announced that very little trouble was had in the combustion chamber and that no catalyst had been employed, as the union of hydrogen and chlorine was extremely rapid without any catalyst. As a matter of fact, for months at a time no one had gone near the combustion chamber. The gases were produced by electrolysis, the hydrochloric acid gas being absorbed as usual in absorption chains and tourills.

N. T. Bacon then read a paper on "Vapor Tension at Low Temperatures." This was a theoretical paper and aroused considerable controversy.

Dr. Haslam then read a paper by Evans and Whitman on "The Bleaching of Nitric Acid with Air." This paper was undertaken as a study in the Graduate School of the Massachusetts Institute of Technology at one of their co-operating plants and gives a quantitative answer to a number of factors which have long been known to operating chemists. The bleaching of nitric acid with air is not new but a quantitative study of it has never been published. This paper will appear in a subsequent issue of this magazine.

Tank Cars for Hydrochloric Acid and Chlorine

J. M. Rowland of the Hooker Chemical Co. after discussing the unsatisfactory tanks made from impregnated wood and the high maintenance cost of these tanks, described a steel storage tank lined with unvulcanized para rubber. The rubber is cemented to the steel with a friction fabric. This tank has been quite successful in transporting the high quality "Hooker White" acid. This was so successful that they decided to try it out in tank cars and now have nine tank cars of 35-ton capacity which have been giving service for the last four months. Some of them have given even longer service.

F. C. Zeisberg then read a paper on hard-rubber lined tank cars and described a tank which had been constructed of steel with a hard rubber shell, the shell being protected from the steel with a lining of soft unvulcanized rubber. They have found this tank very satisfactory and anticipate the use of long tank cars if the present satisfaction is continued. One of the principal advantages of this tank is that it can be very easily cleaned and used for different liquids. G. A. Richter mentioned also the use of rubber lining for resistance to chlorine.

J. L. K. Snyder and H. C. Wells of the Niagara Alkali Co., read a paper on the transportation of liquid chlorine. The specifications for the 1-ton drums on the 15-ton tank cars were elaborated and the advisability of insulation and safety valves rather than fusible plugs was discussed. The present specifications which require three fusible plugs which would blow out at a temperature of 150 deg. would allow the liquid chlorine to blow out of the tank whereas a safety valve would simply blow off the gaseous chlorine which was causing the excess pressure. Another point of the specifications discussed concerned the desirability of having a check valve to prevent loss in case the outside valves were sheared off. Finally, the destruction of a liquid chlorine pool was discussed and the addition of water and earth was recommended. Chlorine hydrate, which is

[1] *Chem. & Met. Eng.*, vol. 26, No. 26, June 20, 1920, p. 1217.

LARKIN CO. PLANT FROM THE AIR

formed when water is added to liquid chlorine, gives off chlorine vapor at a very slow speed.

Max Mauran discussed a new unit tank car for chlorine. In this car he placed 15 1-ton containers on a permanent cradle with proper bracing. This kind of car, he believes, would permit the minimum rate of transportation allowed on a tank car and at the same time would avoid demurrage charges, since the drums could easily be swung from place. Then, too, it would not tax the consuming company with large storage of liquid chlorine.

Phosphoric Acid by a New Process of Treating Phosphate Rock

W. H. Waggaman discussed the advances which have been made at the Bureau of Soils in the production of phosphoric acid. This process avoids the use of sulphuric acid which seems to set a definite low limit on the price of phosphoric acid. If a process could be devised which would produce phosphoric acid cheaply its natural advantages over sulphuric acid would displace this acid for many processes. Among other things which would have to be done would be the elimination of the selection and washing of phosphate rock at the mine. This would cut down the expense of mining considerably. In the sulphuric acid process a product containing 16 per cent phosphoric acid is obtained, whereas in the furnace method a very much purer phosphoric acid results. The furnace method, so-called, consists in heating silica and phosphate rock with or without carbon. It was first suggested by a French engineer in 1867 and was patented in the United States in 1895. However, it is still in an investigation stage although one plant designed by one of the men formerly with the Bureau of Soils, is now in operation in Alabama. Only short runs have been made on the furnaces and estimates over a run of 20 hours would indicate something on the order of 2½ cents per unit P_2O_5 which compares reasonably favorably with present market prices. Both electric and open hearth furnaces have been used and the comparison is very much in favor of the open hearth process, for with power at $25 per hp.-year we could pay $23 per ton for fuel, which is, of course, far above any market price. The efficiency of the electric process is however, better and there is undoubtedly less radiation. But as phosphate mines and electric power do not exist closely together, it is more than likely that if this process develops commercially the open hearth process will be used.

This paper elicited a great deal of very interesting discussion. Mr. Marshall suggested that 2½ cents per unit P_2O_5 is not an advantageous price as far as this new process is concerned and Mr. Landis of the American Cyanamid Co. said that he felt that there was one problem which distinctly militated against the success of this process—the lack of satisfactory refractory. Is there any refractory in existence which would stand up under the replacement of phosphate by silica? Without such a refractory the process was bound to fail. Mr. Landis stated that without using any carbon and thus going through the phosphorus stage from phosphate rock, the American Cyanamid Co. had obtained a 75 per cent recovery simply by replacement of phosphate with silica. This materially reduces the necessity for cheap power.

The final paper of the meeting was presented by G. T. Walker and discussed the crystallization of tri-sodium phosphate. First he presented theoretical curves showing that the true tri-sodium phosphate actually existed in solutions as far as the solubility curves could be interpreted and then discussed at some length the apparatus made by the Swenson Evaporator Co. and designed by himself, in which tri-sodium phosphate was crystallized successfully. This consisted of a tank through which the crystals were conveyed by means of a large conveyor and which was cooled on the outside by a water-cooled jacket.[2]

It is perhaps not inappropriate before writing *finis* to the Niagara Falls meeting, to comment on the generosity of the Institute toward its guests. Many of them invariably express their gratitude at being allowed to participate so completely in the activities of the Institute. A society with such unusually high standards of membership is not ordinarily so generous. Let this be considered therefore as a vote of thanks on behalf of the guests to the Institute.

New French Mill to Make Paper From Grass

The French paper industry is gradually emerging from the crisis caused by the difficulty in obtaining raw material from abroad. Every effort is being made to discover new material with which to manufacture paper pulp. A new company has just been organized under the name of "L'Alfa," with a capital of 8,000,000 francs, according to a report to the Department of Commerce from Commercial Attaché Huntington, for the purpose of producing paper pulp from plants, and especially from esparto or alfa grass, which is found in great quantities in Algeria and Tunis. The main office is situated at 124 Rue de la Boetie, Paris.

The new company has leased part of the Sorgues powder factory, near Avignon, and expects to produce pulp within a year. Other experiments are being made with vine shoote and have apparently proved satisfactory. Another effort is being made to acclimatize the Canadian poplar tree in France.

The French shipping company Les Armateurs Français is organizing a special service for the transportation of chemical wood pulp from Finland to France. The first shipment of 1,556 metric tons of paper pulp has just been discharged at Nantes and Bordeaux, coming from Hango, Finland. France hitherto has depended upon foreign ships for such transportation.

[2] *Chem. & Met. Eng.*, vol. 26, No. 15, April 12, 1922, p. 702.

American Society for Testing Materials

Pig Iron Specifications Criticised by Steel Foundrymen—Important Symposium on Impact Testing—Uncertain Whether All Metals Possess an Endurance Limit Against Fatigue—Silicon a Great Help in Making Sound Aluminum Alloy Castings

AFTER two years' absence, the American Society for Testing Materials returned to its "stamping grounds" at Atlantic City. Its meeting held during the week of June 26 was perhaps the best attended in its history and perhaps also the most comfortable—the Chalfonte-Haddon Hall hotels attending to their part admirably.

As is well known, most of the work of the Society is done in committee. The reports made to the open sessions cover only the points upon which substantial agreement has been reached, and very rarely indeed is any controversy excited. Perhaps this custom was partly responsible for the apathy with which a very large gathering of men received the important report of the Joint Committee on Sulphur in Rivet Steel.[1] Furthermore, the Committee itself declined to draw conclusions or discuss its published results, for reasons (not stated) which were said to justify its course. With such a stand taken by those who knew most about the tests, there was little left for others to do but hope that the Committee will speedily make known its mind on the effect of sulphur on rivet steel, thus erecting a target to shoot at.

Pig Iron Specifications

In refreshing contrast to this state of affairs, the Committee on Cast Iron was severely criticised in attempting to hold that its specifications for "Foundry Pig Iron" was suitable for steel foundries or malleable iron foundries. As a matter of fact, this specification specifies nothing much but allowable *variations* in chemical analysis (the actual analysis is supposed to be agreed upon for each individual lot according to the need of the foundryman or the supply at the blast furnace), and its method of sampling and inspection. This state of affairs was justified by saying that it would be impossible to specify chemical analysis for each style of casting, large or small, ranging from a washer to a hydraulic cylinder—composition must be adjusted by the foundryman to his molding, melting and pouring practice. On the other hand, it was pointed out that any clean pig of iron would conform to the specification. Steel foundrymen objected to purchasing pig with a phosphorus of 0.15 maximum; or with manganese varying plus or minus 0.20 per cent. These figures are called for in the specification, and any exception thereto would probably involve an increased price.

Fatigue of Metal

Professors Moore, Kommers and Jasper, of the University of Illinois, presented a short paper recounting some of the main findings of the Joint Investigation of the Fatigue of Metals.[2] There are three main indications that tough steel possesses a definite endurance limit. If the numerical values obtained at Urbana are plotted on cross-section paper or logarithmic paper there seems to be a definite change of direction at a certain stress, the line becoming horizontal beyond. L. E. Tuckerman of the Bureau of Standards replotted some of the results on log log paper and found even a more pronounced break in the curves. Second, if stress be plotted against rise in temperature caused thereby, a sharp change in direction occurs at approximately the same stress. Third, if a bar which has endured 100 million repetitions just below the endurance limit be immediately tested in tension, its ultimate strength will be found to be unchanged or even increased slightly.

D. J. McAdam, Jr., whose extensive tests on rotating cantilever beams were reported in *Chemical & Metallurgical Engineering* for Dec. 14, 1921, vol. 25, p. 1081, stated that he had recently completed a number of tests at rather high loads, causing quick failures. Combining these data with published tests on long-time runs on the same steels, and plotting the results on cross-section paper, a very smooth parabolic curve resulted, becoming almost horizontal for higher endurances. He still insists, however, that the data in his possession indicate that the curves possess an appreciable, though small inclination, and consequently fail to mark any definite endurance limit, below which that steel will never fail.

Commenting on this same point, Dr. Haakon Styri of the S. K. F. Research Laboratories remarked that one of their new testing machines induces reversed axial stresses in the specimen. The only run now available shows no break in continuity when the loads from 12,000 to 55,000 lb. per sq.in. are plotted against temperature rise, even though the temperature goes up very rapidly at the high loads.

Furthermore, R. L. Templin of the Aluminum Co. of America said that their extensive tests on aluminum and magnesium alloys indicate no such definite endurance limits as Dr. Moore finds for steel. Many of the SN curves show an arrest, but later the curve again changes in direction, becoming approximately parallel to that for heavier loads.

Analyzing the results of two independent investigations, Mr. Tuckerman noted that the only specimens in the two series capable of direct comparison were of ingot iron. The fatigue strengths at Annapolis were consistently lower, however, a fact which may be explainable by differences in severity of machining operations when preparing the specimens, which may induce internal stresses or even rather deep flaws glossed over by the final polish. Or it might be due to heat treatment: the Annapolis material was normalized, while that sent to Urbana was box annealed.

Prof. Moore emphasized that endurance tests were to be used in conjunction with other physical tests; even when short time tests were available, it would be continually necessary to operate fatigue tests out to hundreds of millions of reversals. Consequently it was

[1] Reviewed at length in *Chem. & Met. Eng.*, May 31, 1922, vol. 26, pp. 1011 and 1019.
[2] *Chem. & Met. Eng.*, vol. 24, p. 370; vol. 25, p. 1141.

necessary to devise means whereby the alternations could be impressed at high speed. (Lacking endurance tests, it had already been demonstrated that a moderately close approximation for tough steels would be 45 per cent of the tensile strength or 250 times the Brinell hardness.) Endurance tests are naturally of prime importance to the builders of high speed machines, turbines or springs (with stops to prevent overload). Automobile manufacturers often prefer the Stanton repeated impact test: It is intermediate in severity between the alternating test and the Charpy, and very useful since motor parts are continually subjected to moderate but very seldom to overpowering shocks.

Non-Ferrous Metals and Alloys

Attached to the report of the Committee on Non-Ferrous Metals and Alloys was an appendix by John R. Freeman, Jr., of the Bureau of Standards on the physical properties of the 12 A. S. T. M. standard white metal bearing alloys. It was found that alloys made under commercial conditions have a slightly greater strength and hardness at room temperatures than similar alloys made under close laboratory control. When testing at 100 deg. C. these properties are reduced by approximately 50 per cent, and the order reversed. Cylindrical test specimens 1.5 x 1 in. are easier to handle and more reliable than those twice as long. Brinell hardness measured with a 10 mm. ball under 100 kg. load gives very slightly higher results than when tested under 500 kg. load.

Aluminum-copper-silicon alloys were discussed in a separate paper by E. H. Dix, Jr., and A. J. Lyon of the Army Air Service. In order to test the brittleness of various alloys when cooling in the mold, a "hot shortness" test was devised. It consisted of making a green sand casting of ½-in. test bars with enlarged end bosses. These bosses gripped pins held 12 in. apart by a heavy iron plate. Many popular aluminum compositions are not able to produce a sound bar when cast in such a way, but only one of the alloys noted in this report (85:6:9 Al:Cu:Si) cracked in this test. If these cold bars are pulled in a tension machine, they will show slightly higher strength than those cast without constraint. These results are really due to actual ductility just after solidification, since there is little difference in coefficient of expansion or in shrinkage in the new and old mixtures. Silicon should be 3 to 6 per cent, the lower limit being preferable if copper is added. Four per cent of the latter is recommended, especially when machinability is desired. Without copper, the alloys tear much the same as pure aluminum, and dull the tools very quickly. The recommended alloy can be cast around hard cores without danger of cracking, and the tendency to draw and shrink at joints between thick and thin sections is surprisingly small. Physical properties of two alloys at room temperature follow:

	94:6 Al:Si	93:3:4 Al:Si:Cu
Tensile strength	19,800 lb. per sq.in.	21,800 lb. per sq.in.
Elongation in 2 in.	4.2 per cent	2.1 per cent
Charpy impact	2.06 ft.lb.	2.13 ft.lb.
Scleroscope hardness	9.5	13.2
Brinell hardness (500 kg.)	37	55
Shrinkage	0.161 in. per ft.	0.164 in. per ft.
Coefficient of expansion	23.4×10^{-6}	24.1×10^{-6}
Specific gravity	2.63	2.71

Corrosion

Last year (*Chem. & Met. Eng.*, vol. 24, p. 1145) the Committee on Corrosion of Iron and Steel was able to report the definite superiority of copper bearing sheets when exposed to atmospheric corrosion in the Pittsburgh district. All the 22-gage sheets, both copper bearing and copper free sheets, have now completed their history with the exception of two heats of copper bearing bessemer steels, which have no failures at all. Some 16-gage copper free sheets are beginning to fail in the same order as noted in the lighter material; no 16-g. copper bearing sheet has yet been perforated. Exposure tests at Fort Sheridan, in open country, are beginning to develop failures in the light gage copper free sheets first to fail at Pittsburgh.

Another quick test for the amount of zinc on galvanized articles was reported by D. M. Strickland of the American Rolling Mill Co. If a 2¼ x 2¼ in. piece of the sheet is snipped off, immersed in 100 cc. of concentrated HCl and the rise in temperature noted by an accurate thermometer reading to 0.1 deg. C., the grains of zinc taken into solution (and for this size specimen, the ounces of zinc per sq.ft. of surface) equal the temperature rise multiplied by 0.168. The method is said to give quite accurate results, requires but a few seconds, and can be easily performed in the field. However, it gives no information on the uniformity of coating, or whether the same thickness of zinc is present on both sides of the sheet.

A very suggestive note, entitled "Preliminary Notes on Corrosion," by Prof. Wilder D. Bancroft of Cornell University, outlined some of the lines of research along which it is possible to approach the solution of the corrosion problem. He emphasized particularly the importance of studying the films which form in the atmosphere or other corroding media, films whose character influence subsequent action far more than that of the underlying metal. Calling attention again to the need of an accelerated test, he ventured the opinion that when it was found it would be a rapid electrochemical test.

In commenting on the latter point, F. N. Speller said that he had found a useful test for estimating expected corrosion in closed systems handling water. It consisted of measuring the oxygen extracted from solution while passing through a given length of the pipe or over a given surface. Many speakers emphasized the importance of the film action, and deplored the lack of information in this matter. George K. Elliott called attention to the fact that a high polish often produces an extremely resistant film, apparently by mechanical means. H. S. Rawdon pointed out that most of Prof. Bancroft's suggestions applied to pure metals or alloys of the solid solution type, while alloys containing more than one metallographic constituent would probably act far differently.

W. S. Calcott, of the du Pont Co., told of efforts they had made to translate laboratory experiments on corrosion to the operating department, when the latter was desirous of building a container for a certain liquid or vapor, for instance. It seemed that every problem was unique and no amount of work was able to express the results of various experiments in a simple formula until it was suggested that the corrosion action was really a compound action, consisting first of the *formation* of a reaction product, and second the *removal* of this product. Following this lead, it was found possible to develop an equation, say, for the rate of formation of oxide of aluminum by acetic acid. Another equation was constructed expressing the solubility of this oxide in acetic acid. Combining these two it was found possible to predict with a fair degree of accuracy the action of that acid on an aluminum container.

Impact Testing

Ten papers on Impact Testing occupied one evening's meeting, the whole subject being examined in considerable detail. Bound together the preprints total over 100 pages, and it is naturally impossible to abstract their contents adequately in a few lines. Each interested engineer will wish to study the pamphlet in detail.

H. L. Whittemore, of the Bureau of Standards, briefly sketched the historical development of the test and listed the literature. The earliest machines still survive in the falling tup used to test rails and axles.

D. J. McAdam, Jr., of the Naval Engineering Experiment Station, then described the dozen or more machines proposed and now in use (to some extent at least) for testing either notched or unnotched specimens in one of four ways: Tension, shear, as a simple beam, or as a cantilever. The author outlined published information indicating that the figures found for resilience of the metal will be substantially unaffected by considerable variations in the speed of the blow and weight of anvil, or small variations in the weight of the hammer—if that weight is accurately known. Theoretical considerations on the size and shape of the specimen and notch indicates that this is of major importance. Unnotched specimens under impact will develop crystalline or granular structures characteristic of metal broken with little plastic deformation only in the most brittle materials. A properly prepared specimen should show an outward region of fibrous fracture, underlain by a crystalline or granular area. In the toughest metal this may only be had if the notch ends in a curve of short radius.

The great difficulty in measuring the pressures, accelerations and forces involved in impact testing, where failure occurs within 0.0015 to 0.006 sec., was discussed by Messrs. C. E. Margerum, of the U. S. Naval Ordnance Plant, Armin Elmendorf, of the Haskelite Manufacturing Corp., H. F. Moore of the Univ. of Illinois, and E. B. Smith of the Bureau of Public Roads. On account of the great decellerations involved, the autographic recording instruments must be of minute mass and act directly—without gearing. Magnification must be subsequently done microscopically. After such a time-space curve is found, before the acceleration may be computed (and hence the force) its second derivative must be worked out by laborious computation or delicate instruments, a method giving ample opportunity for errors. Mr. Margerum therefore recommended the crusher gage commonly used to determine explosion pressures, where the pressure drives in a small plunger, shortening a tiny cylinder of copper.

In view of the fact that the tensile test is performed by static forces, while the impact test measures energy for almost instantaneous rupture, and in view of the just described difficulties of measuring the accelerations necessary to transform energy into force. Messrs. F. C. Langenburg and N. Richardson of Watertown Arsenal expressed the opinion that it is useless to expect a simple or constant relation between the indications of the two tests; it varies with the nature of the steel. They have experimented with steels which broke in static tension with an elongation across the notch of about 175 per cent, whereas under impact the elongation was only 30 per cent. Two distinct types of fractures naturally resulted, viz., fibrous and crystalline. In view of the fact, therefore, that tension and impact testing reveal two different properties of metal, the Watertown Arsenal now judges the acceptability of gun forgings by the Charpy machine regardless of the tensile results, having found that no gun jacket or tube possessing an impact value exceeding 6 ft.-lb. has ever ruptured in service from causes which cannot definitely be assigned to defective ammunition, excessive powder pressure, and such like.

C. L. Warwick, Secretary of the Society, reported that an extended questionnaire had developed the fact that much impact testing was being done in America to determine toughness in heat-treated metal and to control specified heat-treatment, to determine ductility, to study causes of failure, and for acceptance of materials to work under heavy shocks. In view of the wide variety of machines and bars being used, it seemed desirable to attempt to simplify existing practice, especially in the shape of bar and notch, so that comparable results might be obtained in different laboratories.

Busheled Merchant Bar Iron

W. M. Myers, of the Highland Iron and Steel Co., noted that about two-thirds of the "wrought iron" made in this country—in fact nearly all the merchant bars—is busheled scrap. Busheling consists in heating to a welding heat in a reverberatory furnace, miscellaneous iron, steel, or a mixture of iron and steel scrap cut into small pieces. After welding heat is reached, the pasty mass is balled up, removed from the furnace, squeezed and rolled exactly as is true wrought iron made from puddling pig. In fact, the process originated soon after cheap Bessemer steel entered the market, and many puddling mills started reworking scrap rather than go out of business.

Busheled merchant bar may be indistinguishable from wrought iron made by puddling by chemical analysis, and only with difficulty under the microscope if the scrap used contains no steel. As pointed out by James Aston, of the A. M. Byers Co., it involves a prohibitive cost to insure the use of nothing but good scrap, and since the nature of the metal is unchanged, busheled bar is no better than its raw materials. True wrought iron is a composite material, and both the metallic portions and its slag inclusions are essential ingredients. Slag in busheled bar is essentially an iron oxide, whereas slag in wrought iron is the reaction product from refining pig iron, i.e., phosphide and silicates of iron. If much steel is used in the busheling furnace, the fact may be indicated by chemical analysis, showing carbon and manganese greater than 0.10 per cent. The nick and break test is also apt to be more crystalline than fibrous.

Increased Requirements for Malleable Castings

Progress in the betterment of the iron used in malleable castings is recorded by the specifications of the American Society for Testing Materials. Specifications were originated in 1904 and no changes were made for eleven years. In 1915 the first revision was made. Four years later, in 1919, the requirements were materially increased. The tensile strength requirement was raised from 38,000 lb. per sq.in. to 45,000 lb. per sq.in. and the requirement for elongation was raised from 5 per cent in 2 in. to 7.5 per cent in 2 in. Malleable foundries have been working to these specifications for three years, and it has been decided that malleable iron could be made commercially with still better physical properties. Specifications were therefore revised at the recent meeting of the A.S.T.M., so that the required tensile strength is 50,000 lb. per sq.in. and the elongation 10 per cent in 2 in.

Chemists in Public Life

General Tendency of Chemists Is to Take Interest Only in Such Affairs as Concern Their Personal Welfare — A Survey Shows That Few Chemists Are Public Office Holders—Chemical Club Organizes Council to Promote Public Welfare—Midland, Mich., a City Run by Chemists

AN EDITORIAL SURVEY

ON MARCH 15 last we published an editorial about the part taken by chemists in public affairs which was merely another reminder of an opinion that we have held and mentioned at other times on divers occasions. In substance our contention was that the chemist is among the most essential of human factors in the development of civic and community welfare and advancement, and that we rarely hear of him in this respect. We held that as citizens chemists may contribute great and enduring services to the communities in which they live, and that, generally speaking, they do not come to the front and volunteer to contribute in the measure that lawyers do.

There are more lawyers in the country than are needed, and fewer chemists than might profitably be employed. True, there are many chemists looking for work and not finding it at the present moment, but that does not mean that work for them is lacking. There is work for them in abundance, but the people who direct affairs are ignorant in this respect, and they fail to see the need of chemistry in the very places where it is needed most.

BUSINESS OF CHEMISTS TO MAKE NEED OF CHEMISTRY KNOWN

Now it is the business of chemists to make these needs known, and they become known only when they are uttered as opinions by persons of eminence or in authority; by persons whose advice is sought and followed. This does not mean that they are to be spoken by someone in the public employ, whether elected or appointed; it means they must emanate from someone who has won the confidence of the community.

We thought we'd see whether we had guessed wrong or not, and we wrote to representative chemists in different parts of the country, asking each if there were in his section chemists who are participating in public activities. Were there any who held public or quasi-public office? Were there any who are prominent in public speaking or reform movements or any other phase of public welfare? We discovered from the replies we received that we had been wholly wrong in our opinion of the activities of chemists in regard to the general welfare in one single city, and that a small one of 5,500 inhabitants. And we hope soon to find ourselves in error in respect to one other. Before referring to these in particular, however, let us quote from a few of our other answers, some of which are less encouraging. Here is one:

"Chemists here are much like other human beings and are taking interest only in such affairs, public or private, as concern their personal welfare. They are heard in public only when they have an ax to grind. And the few who have axes to grind are the ones who are always ready to talk. . . . Personally I think we chemists should not talk in public about chemical affairs. Our unvarnished statements are too often dressed up to make interesting news items, and then we have to apologize."

That, if you please, about the members of a learned profession! If our correspondent had said, "Chemists are very like clerks in boot and shoe stores, or cigar stores, or like street railway conductors," the words that follow might have been convincing—if that is the kind of chemists they have in that region. At the same time it would have been manifestly unfair. When we remember that some of the most eminent savants in the country are neighbors of our correspondent, we feel that he has a wrong slant on the subject. We learn from him, however, that chemists are not active in public affairs in his region.

The following is from one of the smaller states devoted to agriculture rather than to industry:

"I am afraid there are no members in our section who are prominent office holders. We are mostly teachers, and, to some extent, investigators; and how in the world can such a man do his duty by his laboratories and have time to gain prominence in politics? I do know several chemists prominent in public affairs, but they are pretty poor chemists! The lawyer turns to public affairs and politics as naturally as a duck takes to the pond, and the way in which he has made himself known is oftentimes no cause for envy. It seems to me that laboratory men must in the nature of things be, to a considerable extent, recluses; but the results obtained by the craft as a whole are surely no cause for regret!"

CHEMISTS ARE CITIZENS WITH MORE THAN AVERAGE RESPONSIBILITIES

Of course the reference to chemists as craftsmen is a mere slip of the pen. We are firm believers in the teaching of sound laboratory craftsmanship, but how about the mind of the chemist? As a citizen he has the obligations of a citizen, which are, of course, no less than those of a cabinet-maker or pipe-fitter or any other craftsman. But in addition to this he has entered a profession on which rests the responsibility of seeking and finding the nature of things and of applying this knowledge to the advancement of human welfare. His professional preparation is supposed to have equipped him with the vision to see what is denied to others. Shall he then hold his peace when opportunity for helpfulness presents itself, lest he be misunderstood? He is one of the *illuminati* of the community in which he lives. Should he hide his light under a bushel?

Another letter tells us that the head of the department of chemistry of the local college is president of the Chamber of Commerce. That sounds right to us.

And the secretary of the local section of the A.C.S. is superintendent of the Presbyterian Sunday School, which also indicates merit. "Aside from these two public services," the writer says, "I do not believe any of the other chemists in this part of the state are affiliated in any way with public work outside their profession."

Still another names four gentlemen who have made many addresses before Kiwanis, Rotary and Women's clubs and high-school audiences, and says there are others who have done the same thing.

Chemists Active in University Towns

We learn that the head of the department of chemistry of a state university has achieved prominence in connection with chemical work for industrial companies (which is not what we were after) and that in Scottish Rite Masonry he has conferred no fewer than 15,000 32nd degrees. The one other chemist of the section has been an active organizer of chemical and other scientific societies, farmers' clubs, rural life betterment associations, and while never holding any elective public office, is very active in public speaking. He says, "The scientists are the men who actually have the goods, but they are the worst salesmen I have ever seen!"

In another state university one of the professors of chemistry has served for 15 years as a member of the Board of Education and is at present a member of the Board of Health. With one of his colleagues he is a member of the Kiwanis Club. Still another professor is prominent in giving addresses before various public organizations.

A letter from a city of from 150,000 to 200,000 inhabitants which is the center of a great chemical industry tells of one gentleman of the chemical profession who takes a rather active interest in industrial social relations and reform movements. Otherwise, so far as our correspondent knows, few or none of the chemists of the section "are prominent in public welfare work or in public speaking."

An interesting note in regard to this very city is that its greatest chemical industry has passed from the hands of its founders and organizers into those of a group of "investors" who, on obtaining control, dismantled research laboratories, discharged chemists and enjoyed a general and promiscuous chemical head- and heart-cracking party. The chemists remaining do not know whether they are afoot or ahorseback; most, if not all of them, punch the time clock and receive their instructions from a group of traders who are just such strangers to chemistry as they are to humility. The chemists have ceased to function as men of science, and have become a kind of indentured craftsmen. They are indentured because jobs are scarce. We should not expect much work for the general welfare from men who are broken in spirit.

Chicago Taking the Matter Up

From Chicago chemists we obtained a formal reply to the effect that a sub-committee of the local section had been appointed to take the matter up. We are informed, however, that on receipt of our letter, the members of the section, who are very live wires, said, "Well, what about it?" They appointed their committee, and discovered that one of their number was rather active in certain charitable enterprises, but that on the whole the members of the section were not playing a prominent part in public affairs. But the Chicago chemists are not broken in spirit, and we expect within a year or so to see them as active in municipal affairs as the members of the local branches of the American Medical Association or the Bar Association.

From another Middle Western source our correspondent writes that he knows of no one of their number "who is markedly active in public affairs, such as the lawyers of our community are." Then follows an argument to the effect that lawyers do not often make useful discoveries and inventions along scientific lines. Holy Writ is quoted, saying that no man can serve two masters, and that the man who is in the public eye is not of necessity a greater servant of humanity than the man who patiently and faithfully serves in the laboratory. "Of course," he continues, "there is nothing in this attitude which could be construed to mean that the chemist should not do his full duty as a citizen, taking part in the activities of his city and state whenever called upon. This should, however, be *as a citizen and not as a chemist.* In other words, citizenship should not recognize particular classes."

Obligation to the Community as Chemists

That is just where we take issue. Fifty to 60 per cent of the men and women of that community—unless its intelligence is clear above the average—have a mental age of not over 11 years. They do manual labor and can learn trades. They cannot co-ordinate or connect causes with effect. They can repeat political slogans, but they can't sense great principles. They're ready to say "Let's try" to anything that is proposed, which explains the amazing specimens of men who are elected to be mayors of various large cities. If chemists have no more mind than such morons, then they are not chemists at all; they are mere laboratory drudges. Where does professional obligation come in, we should like to know? The chemist must be able to use his head if he is a real one and not a mere laboratory laborer. That is part of his professional equipment, part of what he should have to offer. Chemistry determines pure water, knows paving and building materials, can take a city's list of materials needed and provide specifications that are sure to cut down taxes; can aid in warding off disease, and must be present in the organization of a health department or in sanitation; it touches public work on every side—and it is up to chemists to do the touching.

We must pass over a number of replies in which we learn of one or two chemists in whole districts who lecture occasionally in public or are engaged in university extension work or who "are members of the Rotary Club," etc. Even in so great a section as St. Louis the secretary does not recall any chemist who is interested to a great extent in public activities, although the value of chemists in civic work is recognized. We are under the impression that here at least two eminent chemists have been overlooked, Dr. Frerichs and Dr. Caspari, who, we believe, have contributed liberally in this respect. We have not heard from Cincinnati, but the great services as a citizen of Dr. John Uri Lloyd would call for comment, and so would, probably, that of Dr. Alfred Springer among others.

Philadelphia Has a List of Distinction

From Philadelphia we have a list of twenty names, and our correspondent is sure there are as many more of whom he does not have intimate knowledge. The list is one of great distinction.

The secretary of a numerous and live section tells us of one of their number who is member of a local school board, and of a second who, as city chemist, "has the privilege of examining many samples of police-captured 'hootch.'" He concludes by saying: "I really do not know of any chemist hereabout who is prominent in public affairs. Probably it is what you expected. Certainly it is one of our weaknesses."

From the foregoing it does appear as though chemists are addicted to the habits of the modest violet. As for those who are engaged in industries which are under the control of traders only, who hold that "anybody can make this stuff, but it takes genius to sell it," we cannot expect much. Their very profession is a badge of inferiority in such cases. Under long-continued control of this sort, it is men of the dray-horse type that settle down. When the day's work is over they want to rest. Imagination is a nuisance. They are excellent men; thoroughly sound and good, but not built for leadership, and those who, without the necessary qualifications, try to lead, and fail, are real nuisances. We merely wish to add the note that it does not require the quality of leadership to contribute.

But now let us turn to a couple of answers that give us real encouragement.

Tacoma Organizes Active Body to Co-operate in Civic Affairs

From Tacoma, Wash., we learn that the Olympic Chemical Club on April 11 last created an active body of six members to co-operate with other civic bodies in the upbuilding of the community. The committee consists of the head of a biological laboratory, a tar refiner, a gentleman who was formerly a dairy expert in the Municipal Health Department, the representative of the du Pont company, the local manager of a large analytical and assay laboratory of Seattle with branches at Portland, Ore., Tacoma, Wash., and Kobe, Japan, and the president of the club, who is manager of a nut butter concern.

It would be difficult for a layman to sense the value of the special lines of chemistry with which these gentlemen are familiar, but among the six members of the council there should be well represented the points of attack on civic problems from the various angles of chemistry. The council meets once a week at luncheon, and has already begun to carry out its duties in accordance with its charter, and is giving every evidence of filling a real need in the city.

The charter is so well drawn that we publish it herewith. It offers the best lead we can give as to how to organize.

The Olympic Chemical Club

Chemical Engineering Council for Public Welfare

The Chemical Engineering Council, hereafter called "The Council," shall be a permanent body of five members selected from among the membership of the Olympic Chemical Club for the purpose of promoting the general welfare of the community in matters pertaining to chemistry, and also to promote the welfare of the chemical profession.

The activities of the council shall be independent of the Olympic Chemical Club except that the members of the council shall be individually responsible to the club for carrying out the purposes of the council and maintaining the dignity of the profession at all times under penalty of impeachment as hereinafter set forth.

The details of organization and duties of the council shall be as follows:

Organization: The members shall be appointed by the president immediately, to serve for the term of the president. As soon as practical thereafter they shall meet and choose by any method they shall see fit necessary officers and shall adopt a system of bylaws, the same to be approved by the club. Vacancies in the council shall be filled by the president as soon as possible. The president of the club shall be a member of the council ex-officio.

Duties: The duties of the council shall be to promote the welfare of the community and the profession:

1. By aiding in the establishment of desirable new industries.
2. By assisting already established industries to devolop along sound and proper lines.
3. By leadership of the community toward better conditions in sanitation, water supply, food inspection, manufacturing and marketing conditions and any matters relating to health and safety as bearing upon and related to the science of chemistry.
4. By educating the public to the advantages of a better appreciation of chemistry and a larger use of professional chemists and chemical engineers.
5. By raising the professional ethics of chemists and chemical engineers.
6. By the exercise of constant vigilance to protect the public from false steps in matters related to chemistry, and from being victimized by ignorant or unscrupulous promoters in matters relating to chemistry.
7. By co-operating with other organizations and agencies in the upbuilding of the community, this co-operation to be limited, however, strictly to matters in which chemistry is involved.
8. By studying the industrial resources of the community and being prepared at any time to supply data to those seeking to establish or develop industries.

The council, however, is specifically directed to avoid, as far as possible, giving free consulting service, or encroaching upon the field of qualified experts. The work of the council is rather to promote public welfare by expanding the field in which professional chemists and chemical engineers can operate for a respectable remuneration. Nothing in this charter is to be construed to mean that free work of a consulting nature is to be done for anybody, except occasionally when it is thought that a strictly limited amount of such free work might be justified as advertising or as publicity directed toward the development of remunerative work.

The council shall submit a report of its activities to each regular meeting of the club.

Impeachment: Any member of the council may be impeached by the club for unprofessional conduct damaging to the council or the club. Such impeachment proceedings shall be conducted by the club with all due care and consideration for the rights of the accused.

The council has our best wishes, and we await with eagerness the reports of its progress.

Midland, Mich., Run by Chemists

We now come to a real little chemical city, which is Midland, Mich., with 5,500 inhabitants, of whom 55, or 1 per cent, are chemists. Note also, please, that its leading chemical industry was organized by a chemist who remains in control and that when hard times came along, instead of regarding its research laboratories as "dead wood" and cutting them out after the manner of some larger concerns under the leadership of bankers, the concern works all the harder to find what it can produce which is wanted.

The City Council is composed of eight aldermen and a mayor, and for 6 years past the mayor and three of the aldermen have been chemists.

One chemist is on the school board, ten are in the Chamber of Commerce, five are members of the Rotary Club, and sixteen, or 33 per cent, are in the Kiwanis Club. All reform movements and welfare organizations, together with most of the church activities in the city, are backed by a good number of chemists. Ten have been active in public speaking along lines in which chemistry touches the public interest. Four are especially considered as deserving attention, being inter-

ested respectively as member of the State Fair Board, director of Rotary Club, in philanthropy, as president of the board of control of Midland Community Center, as prominent in all reform movements, as president of the Midland County Welfare Association, president of Midland Americanization Society, secretary Kiwanis Club, and as health officer. Under the chemical health officer restaurants have been improved 100 per cent by strict enforcement of sanitation laws, and the milk situation has been brought up to a very high standard. But think of improving restaurants 100 per cent by a chemist! We've always maintained it could be done.

Midland is known in Michigan as "The Chemical City." It is small, but its chemical control has paved its streets, lighted it, provided for a filtration plant, and got things generally into shape.

Fifty-five chemists does not seem like a large number here in New York. We have one chemist who is president of the Citizens Union, but we think that if he had a special committee of fifty-five chemists and engineers in that body, keenly alive to the welfare of the city and earnest in their resolution, so far as the chemical and engineering aspects of public affairs were concerned they would be properly attended to. The practical politicians, the Hearst newspapers and Tammany Hall and a good part of the Republican County Committee undoubtedly would be kicking against the effrontery of "those theorists," but in the end we should have a better place to live in.

Legal Notes

By Wellington Gustin

Remedies of Seller on Breach of Contract

The remedies of a seller of goods where the buyer has breached his contract to buy are laid down by the United States Circuit Court of Appeals, Second Circuit, in an action brought by Isaac M. Simonin, trading as C. F. Simonin's Sons, against Sigmund Kranter. (Kranter vs. Simonin, 274 Fed., 791.)

The transaction out of which the suit arose appears to be: Simonin agreed on July 16, 1919, to sell and deliver to Kranter 1,000 bbl. of Ceylon grade coconut oil, not to contain over 7 per cent free fatty acid, at a price of 20c. per lb. net cash, without discount. The buyer agreed to furnish a 90-day confirmed bank credit for documents, payment to be made against an f.a.s. railroad bill of lading, Philadelphia weighmaster's weight certificate and certificate of analysis. By a supplemental agreement on Dec. 1, 1919, there was a substitution of "refined edible coconut oil at a price of 24c. per lb. to be made within one month of Dec. 1, 1919." In other respects the contract of July 16, 1919, was confirmed.

The seller alleged in his suit that on March 5, 1920, he delivered to the buyer 100 bbl. of refined edible coconut oil, and received payment according to the terms of the contract of Dec. 1, 1919; and again he delivered 136 bbl. of oil which buyer refused to accept or pay for. Further the complaint alleged that the seller was ready and willing to deliver, in accordance with the contract of Dec. 1, 1919, the remaining 900 bbl. and demanded shipping instructions, and so repeatedly notified the buyer, who, on each occasion, requested the seller not to ship but to hold the oil subject to his orders; and on May 21, 1920, the seller notified the buyer that he would no longer extend the time for delivery beyond May 21, 1920. The buyer failed to give shipping orders or instructions, or to furnish the confirmed bank credit, as required by the contract of Dec. 1, 1919, and for breach of the contract the seller asked damages of $15,000.

The buyer alleged that the bank credit for documents was waived by the mutual consent of the parties, and further that the seller delivered the balance of 900 bbl. and agreed to store them for the buyer, who agreed to pay for them from time to time as he removed them from the warehouse, and until their removal to pay interest on the purchase price, storage charges, etc., but later insisted on immediate delivery and payment.

Upon a trial the jury found the facts substantially as alleged by the seller. As to the law applying, the Court of Appeals says the seller had as remedies the choice of endeavoring to indemnify himself by storing or retaining the property for the buyer and then to sue him for the entire purchase price, or he could sell the property, acting as an agent for this purpose of the buyer, and recover the difference between the contract price and the price obtained on such result, or he could keep the property as his own and recover the difference between the market price at the time and place of delivery and the contract price. He could do this both under the common law and under the personal property law of New York State (Consolidated Laws, N. Y., chapter 41).

Seller Need Not Show Goods Were in Stock

Again, the court said where the buyer failed to give shipping instructions and to furnish a bank credit, as agreed, it was not necessary for the seller, in order to show readiness to deliver the oil, to establish that he had it in stock; he may have purchased it in the market and resold it to the buyer. The buyer breached the contract by his failure to give shipping instructions and to furnish the bank credit, which excused further performance by the seller, of whom was required only such readiness as was necessary to enable him to make delivery at the time fixed for delivery, such oil being obtainable in the market at the time fixed for delivery.

Use of Rotary Kiln in Making Magnesite Refractory Compound Not Invention

In the recent suit brought by Charles B. Stone against the American Refractories Co., plaintiff sought recovery for infringement of patent 792,822, issued June 20, 1905, to Davidson, for a process or method of making a refractory compound for furnace linings or similar purposes. The District Court dismissed plaintiff's bill, and he appealed. The U. S. Circuit Court of Appeals, Sixth Circuit, has affirmed the decree of the District Court. (274 Fed., 241.)

Claims 3 and 4 of the patent were sued upon. Claim 3 follows: "The process of making a refractory magnesite compound which consists in comminuting natural magnesite, silica and oxide of iron, mixing the ingredients in a dry state, burning the mixture to clinker and comminuting the clinker."

Claim 4 is the same as claim 3, except a rotary kiln is mentioned. Defendant contended claims were invalid and not infringed. The Court of Appeals found that as early as 1896 the most suitable material for making refractory furnace linings needed in certain steel

processes was a magnesite ore found in Austria. This was pulverized, heated to a high temperature, which caused it partly to fuse together in clinker form, and was then ground into a fine granular condition. It might be sold in this shape to the user, to be by him spread upon the floor of the furnace and fused into an unbroken lining, or it might be made up into bricks and used in that form. This ore contained magnesia, iron and silica, and it was commonly supposed that the iron was necessary as a flux for the magnesia, and that the silica was an undesirable element.

Davidson's substantial discovery, as the patent owner in suit contended, was that the silica played a useful part in the combination, in that it reduced the temperature necessary to frit the material. And the court says it may be conceded that this discovery, calling for a purposeful, instead of an incidental, presence of silica, would lend patentability to a claim for putting together by known processes the known ingredients of the natural material, if the necessary novelty existed.

Further the court found that several manufacturers, including the Harbison-Walker Co., had been engaged in making this class of material since long before the date of Davison's invention. About 10 years after the patent was issued this company altered its process, and the American Refractories Co., defendant herein, began to use the process of Harbison-Walker embodying this change. Upon this change the charge of infringement rests.

Was Inventive Step Involved?

In considering this change the court says if it did not involve an inventive step, so that defendant's present process is not patentably distinguishable from that which was used before Davison's invention, Davison can have no patent which can be construed broadly enough to support the charge of infringement and can at the same time be valid.

As far back as 1898 the Harbison-Walker Co., which had been using the Austrian magnesite for this purpose, found difficulty in obtaining this material. Thereupon it proceeded to import and use a Grecian magnesite ore, which was similar to the Austrian save for a deficiency in iron. This deficiency was supplied by adding iron ore, and then the mixture was pulverized, then moistened to make a thick paste. This was made up into small blocks or "dobies" and burned in kilns of the type used in burning bricks. By this process the carbonic acid gas was driven off and the material "dead-burned." It was then in fritted or clinker form and was ground and used as described above. The court assumed the Davison patent extended to the mixture of magnesite and silica, by using the raw material which naturally contained both, and found that it discloses nothing not previously in use by Harbison-Walker, except that Davison mixed his materials dry and burned them in a rotary kiln.

Steps in Court's Reasoning

Therefore the question was presented to the court whether in 1904, date of the application of Davison for his patent, it would have been invention to substitute in the Harbison-Walker process a dry mix and a rotary kiln for a wet mix and a stationary kiln. How the court solved this proposition is here set forth as a matter of information on how it arrives at judicial decisions. Was there a distinct advance in the art beyond what a skilled worker in the art could not do? One skilled in the art to whom this problem was presented would have before him his pulverized magnesite ore, containing silica and needing iron, and also his pulverized iron ore. It was said that he would know that these materials should be mixed as intimately and perfectly as possible and then burned to the fritting or clinker stage. He would know that the rotary kiln was an instrumentality in common use for simultaneous mixing and burning of material which was to be fused into a clinker form. It was then specially familiar in making portland cement. While the finished magnesite refractory and the finished cement are distinctly different products, it is not easy to point out any substantial distinction in the mixing, burning and fritting steps of making the one or the other.

Advantages of Rotary Kilns Well Understood

The substitution of the rotary kiln for the other method of burning, the court thought, was only the step which would have occurred to any one fairly familiar with this kind of work; and this belief was backed up by other patents and usages. The patents to Reid of 1874 and to Ransome of 1886 describe rotary kilns for burning pulverized gypsum, or lime, cement, etc., and specify the advantages of that device for accomplishing what Davison desired to accomplish. The Ransome patent especially points out that for this purpose the operator may take his choice between putting the material in blocks and burning in a stationary kiln, or pulverizing it and feeding it into a rotary kiln, and also points out that the ingredients, such as clay and chalk, may be mixed either wet or dry.

A patent to De Navarro in 1896 describes the distinct advantages of the rotary kiln for making portland cement, but points out that it contains the same ingredients which constitute the magnesite refractory—namely, silica, alumina, iron and magnesia. Though the proportions are very different, the process of mixing and burning is precisely that contemplated by Davison when he calls for a rotary kiln, said the court.

A patent to Krottnaurer in 1900 and one to Lossing in 1901 further describe the operation of rotary kilns to accomplish effective mixing and burning, not only to cement, but, in the latter patent, of earths and chemicals. That there are no such distinctions between burning magnesite and burning cement that the cement kiln would not be familiar to the magnesite worker, the court cited a British patent of 1902 to Kirkpatrick, where Kirkpatrick discusses the use of a rotary or any other suitable furnace or kiln in the manufacture of magnesite compositions for use in furnaces.

Substitution of Rotary Kiln Not Inventive Step

Now the court says putting these considerations with the fact that the use of the rotary kiln for burning magnesite was established in Europe, and that such European usage was known in this country, and with the testimony of experts as to the common knowledge of the rotary kiln and what it would do, it must find that it would not have been invention in 1904 to substitute this process of burning for the kiln burning which Harbison-Walker was using, in its then current method of manufacturing magnesite refractory materials. It follows that the patent cannot receive a construction broad enough to cover a continuation of the old Harbison-Walker method with only this change.

Therefore the Court of Appeals affirmed the decree, being against the claims of the complainant.

Thermal Considerations In Sulphuric Acid Concentration*

A Study of the Physical Properties of Sulphuric Acid Solutions With Curves for Determining the Heat Required for Concentration and the Thermal Efficiency of the Operation

BY FRED C. ZEISBERG
Chemical Department, E. I. du Pont de Nemours & Co.

SULPHURIC ACID is universally concentrated by the application of heat. The first interest of the designer of apparatus to concentrate sulphuric acid must hence lie in the thermal properties of sulphuric acid. Several articles have been written on this subject[1] and one of them[2] at least has treated the subject very thoroughly and comprehensively. The results, however, are not most conveniently expressed, and the original article is not particularly accessible. This, then, must be the excuse for the present attempt to present an old subject from a somewhat different viewpoint.

Specific Heat

The first thermal property of sulphuric acid which interests us is its specific heat. Many determinations have been made[3] of this constant, in addition to those given in Landolt-Börnstein. The figures of Knietsch are out of line with those of other workers, while those of Pascal[4] seem the most probably correct, and are shown graphically in Fig. 1, by the full line. It will

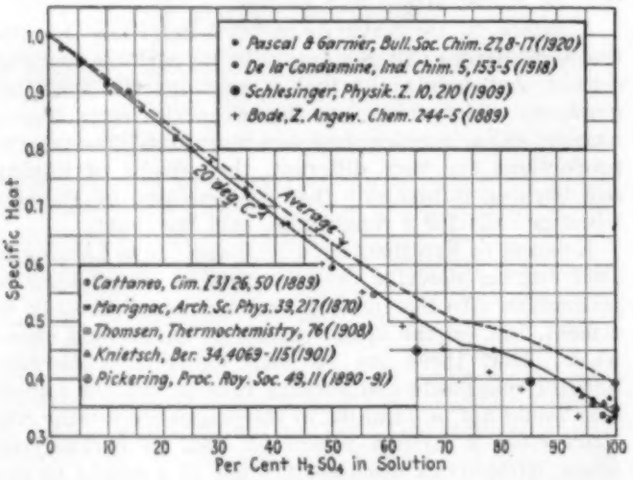

Pascal & Garnier, Bull. Soc. Chim. 27, 8-17 (1920)
De la Condamine, Ind. Chim. 5, 153-5 (1918)
Schlesinger, Physik. Z. 10, 210 (1909)
Bode, Z. Angew. Chem. 244-5 (1889)
20 deg. C.
Average
Cattaneo, Cim. [3] 26, 50 (1889)
Marignac, Arch. Sc. Phys. 33, 217 (1870)
Thomsen, Thermochemistry, 76 (1908)
Knietsch, Ber. 34, 4069-115 (1901)
Pickering, Proc. Roy. Soc. 49, 11 (1890-91)
Specific Heat
Per Cent H_2SO_4 in Solution

FIG. 1—SPECIFIC HEAT OF SULPHURIC ACID SOLUTIONS AT 20 DEG. C., AND AVERAGE BETWEEN 20 DEG. C. AND THE BOILING POINT

be noted that these are for 20 deg. C. As the temperature rises the specific heat increases slightly, but no extensive investigation of the change at various concentrations seems to have been made. Figures reported by de la Condamine[4] indicate that, if the increase of specific heat with the temperature is linear, the average specific heat of 100 per cent H_2SO_4 between 20 deg. C. and the boiling point is about 0.39. There has hence been drawn in Fig. 1 the dotted curve giving the probable value of the average specific heats between 20 deg. C. and the boiling point for all concentrations of H_2SO_4 solution. The values given by this dotted curve have been used in the calculation of the examples which follow.

Boiling Point

The next thermal property of sulphuric acid which interests us is the boiling point of various strength solutions. A number of investigators[5] have studied

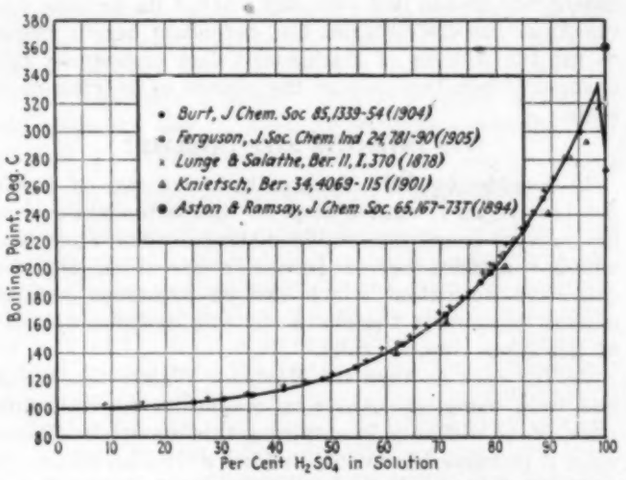

Burt, J. Chem. Soc. 85, 1339-54 (1904)
Ferguson, J. Soc. Chem. Ind. 24, 781-90 (1905)
Lunge & Salathe, Ber. 11, I, 370 (1878)
Knietsch, Ber. 34, 4069-115 (1901)
Aston & Ramsay, J. Chem. Soc. 65, 167-737 (1894)
Boiling Point, Deg. C.
Per Cent H_2SO_4 in Solution

FIG. 2—BOILING POINTS OF SULPHURIC ACID SOLUTIONS AT 760 MM.

this property, but the results of Burt's work appear the most trustworthy. In Fig. 2 the various data have been plotted, the curve being drawn with respect mostly to the points obtained by Burt and Ferguson. Here again it will be observed that Knietsch's results are out of line with those of other investigators. Values read from the curve have been used in the calculations which follow.

Partial Pressures of Vapors From Boiling Sulphuric Acid Solutions

Another thermal property which interests us is the composition of the vapor emitted by boiling sulphuric acid solutions. The literature appears to contain no definite figures, but numerous indefinite references such as hat "boiling sulphuric acid soiutions give off nothing but water vapor until 170 deg. C., equivalent to 72

*A paper presented before the Acid Symposium at the fourteenth semi-annual meeting of the American Institute of Chemical Engineers, Niagara Falls, Canada, June 19 to 22, 1922.

[1] S. U. Pickering, *J. Chem. Soc.*, vol. 57, pp. 64-184; 331-369 (1890); R. Knietsch, *Ber.*, vol. 34, pp. 4069-4115 (1901); Norman Swindin, *Chem. Trade J.*, vol. 59, pp. 369-371 (1916); F. Colin Sutton, *Chem. Age, London*, vol. 5, pp. 178-180 (1921); L. Cerutty, *Chem. Age*, London, vol. 5, pp. 769-760 (1921).

[2] A. W. Porter, *Trans. Faraday Soc.*, vol. 13, pp. 373-400 (1918).

[3] Herman Schlesinger, *Physik. Z.*, vol. 10, pp. 210-215 (1909); C. de la Condamine, *Ind. Chim.*, vol. 5, pp. 153-155 (1918); Paul Pascal and Garnier, *Bull. soc. chim.*, vol. 27, pp. 8-17 (1920); R. Knietsch, *Ber.*, vol. 34, pp. 4069-4115 (1901).

[4] C. de la Condamine, *Ind. Chim.*, vol. 5, pp. 153-155 (1918).

[5] R. Knietsch, *Ber.*, vol. 34, pp. 4069-4115 (1901); G. Lunge and F. Salathe, *Ber.*, vol. 11, No. I, pp. 370-374 (1878); E. A. Aston and W. Ramsay, *J. Chem. Soc.*, vol. 65, pp. 167-173T (1894); B. C. Burt, *J. Chem. Soc.*, vol. 85, pp. 1339-1354 (1904); W. C. Ferguson, *J. Soc. Chem. Ind.*, vol. 24, pp. 781-790 (1905).

per cent H_2SO_4 is reached.[4] The du Pont company several years ago made some rough determinations of these partial pressures[5] which are shown in Fig. 3.

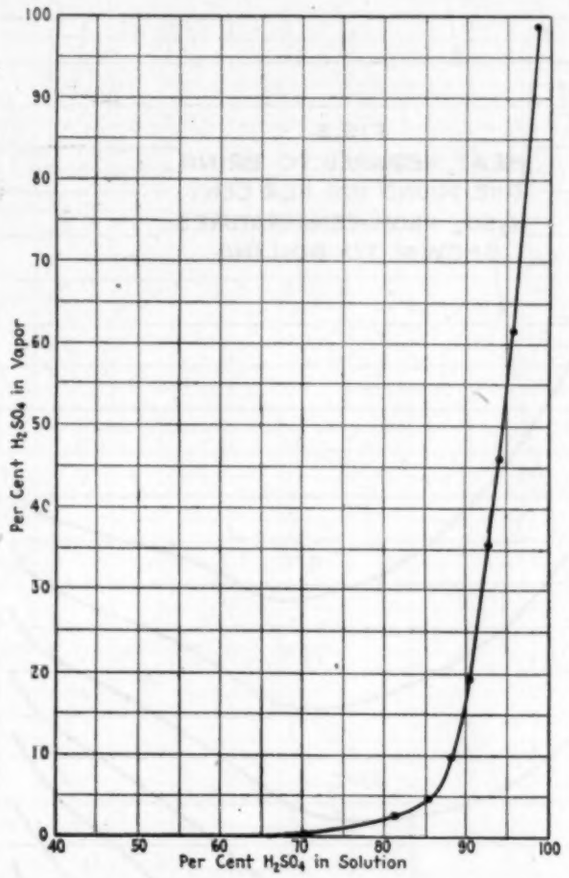


FIG. 3—COMPOSITION OF VAPORS IN EQUILIBRIUM WITH BOILING SULPHURIC ACID SOLUTIONS AT 760 MM.

Heat of Dilution

Still another thermal property which must be known is the heat of dilution of sulphuric acid. This has been investigated by a number of investigators,[7] the values obtained by Thomsen[8] having been selected for use herein. These values are shown graphically in Fig. 4, where both the curve obtained from the experimental results (full) and the one obtained by using the formula derived by Thomsen (dotted) are shown. This formula, it will be observed, agrees well with the experimentally determined points from about 20 per cent H_2SO_4 to 100 per cent. It will be obvious that the heat liberated in diluting from any given strength to any other strength may be read from the curve as the difference between the abcissas at those strengths.

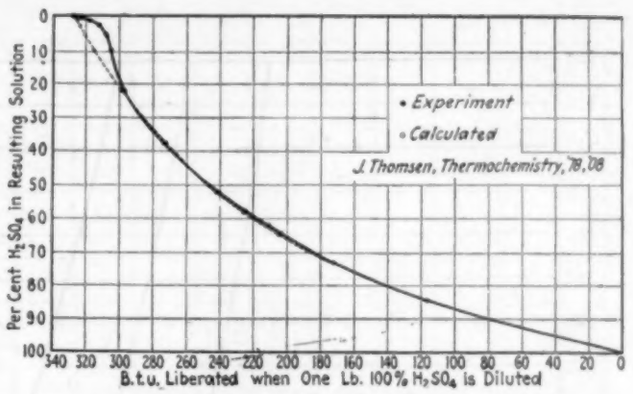


FIG. 4—HEAT OF DILUTION OF SULPHURIC ACID

Heat of Vaporization

The final property which interests us is the heat of vaporization of water. As is well known, this varies with the temperature, and Fig. 5 shows this variation graphically between 0 deg. C. and 350 deg. C., the values of Marks and Davis[9] having been used. In some cases, also, the heat of vaporization of H_2SO_4 itself may be of interest. This is 220 B.t.u. per lb. 100 per cent H_2SO_4.

Thermal Considerations in Concentration

If we now make the asumption that, in the concentration of a given quantity of sulphuric acid solution, it can be heated to the boiling point without the evaporation of any water until the boiling point is reached, the heat input up to the boiling point is made up solely of the sensible heat, which can be expressed by the equation

$$H_s = ws(t_b - t) \qquad (1)$$

in which H_s = sensible heat in B.t.u.
w = weight of acid in pounds.
s = specific heat of acid.
t_b = boiling point in deg. F.
t = original temperature.

After the boiling point is reached, continued input of heat accomplishes three things. Water is evaporated, hydrates of H_2SO_4 are decomposed, and the resulting more highly concentrated solution is raised to a new, higher boiling point. It is therefore perfectly

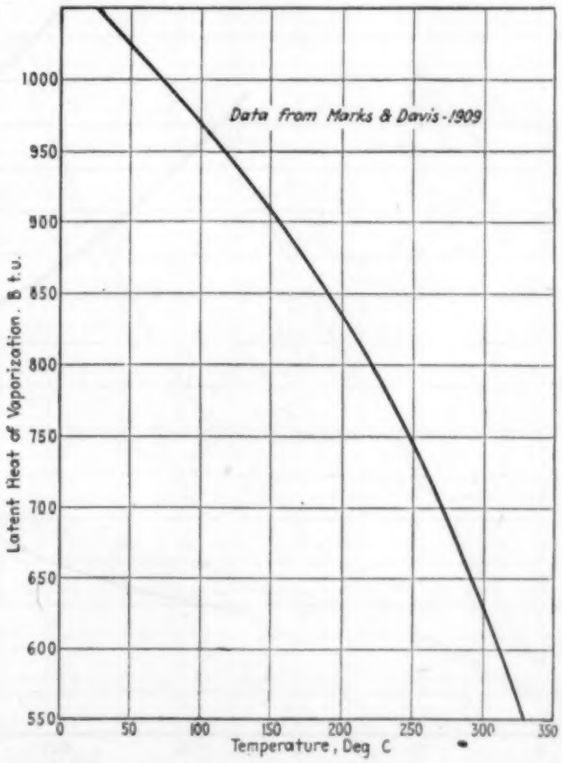


FIG. 5—HEAT OF VAPORIZATION OF WATER

[4] W. C. Sproesser, private communication in du Pont files.

[7] R. Knietsch, *Ber.*, vol. 34, pp. 4069-4115 (1901); L. Pfaundler, *Ber.*, vol. c, pp. 798-800 (1870); J. N. Brönsted, *Z. physik. Chem.*, vol. 68, pp. 693-725 (1910).

[8] J. Thomsen, "Thermochemistry," p. 78, 1908.

[9] Marks and Davis, "Steam Tables and Diagrams," 1908.

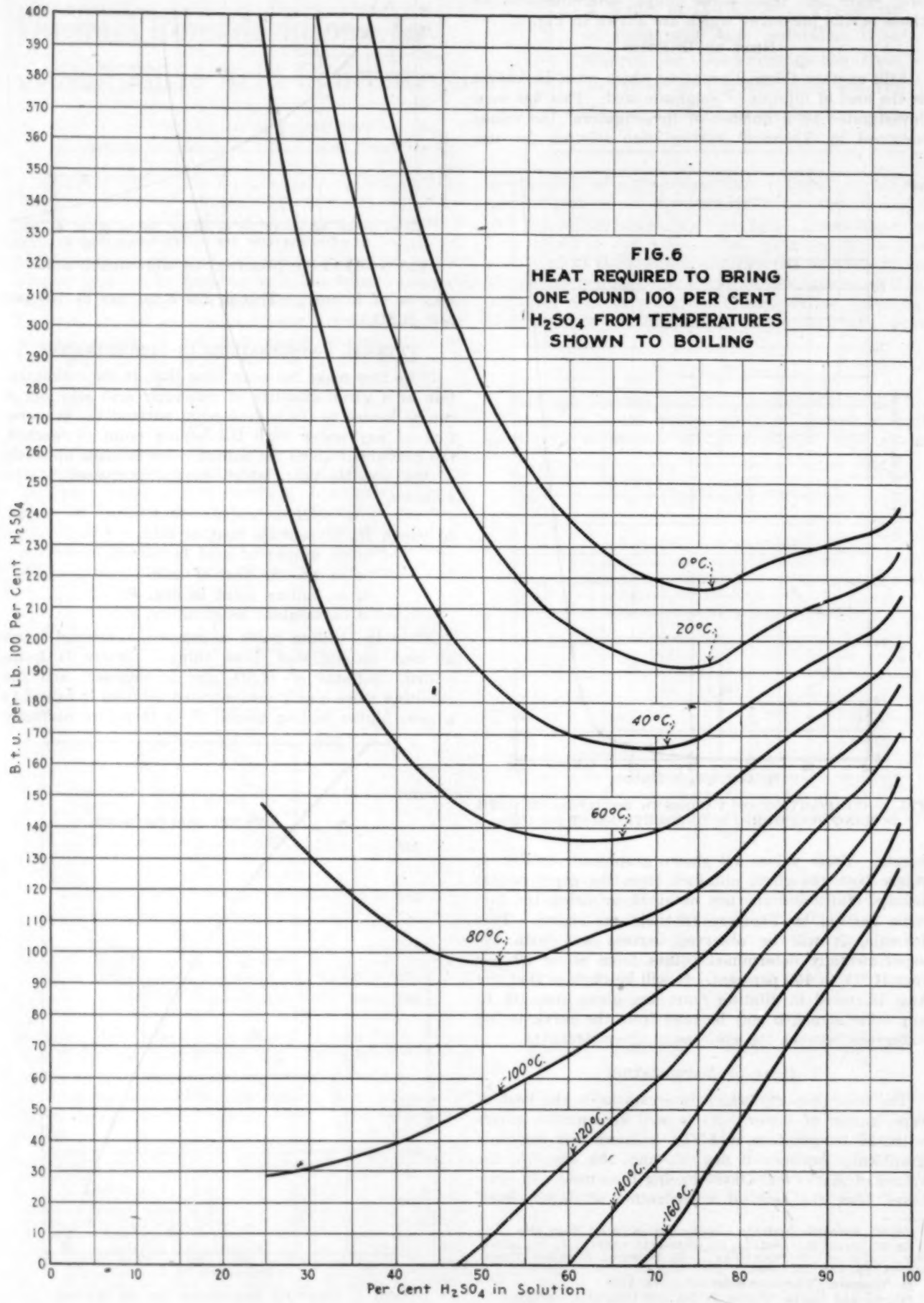


FIG.6
HEAT REQUIRED TO BRING ONE POUND 100 PER CENT H_2SO_4 FROM TEMPERATURES SHOWN TO BOILING
B.t.u. per Lb. 100 Per Cent H_2SO_4
Per Cent H_2SO_4 in Solution
0°C.
20°C.
40°C.
60°C.
80°C.
100°C.
120°C.
140°C.
160°C.

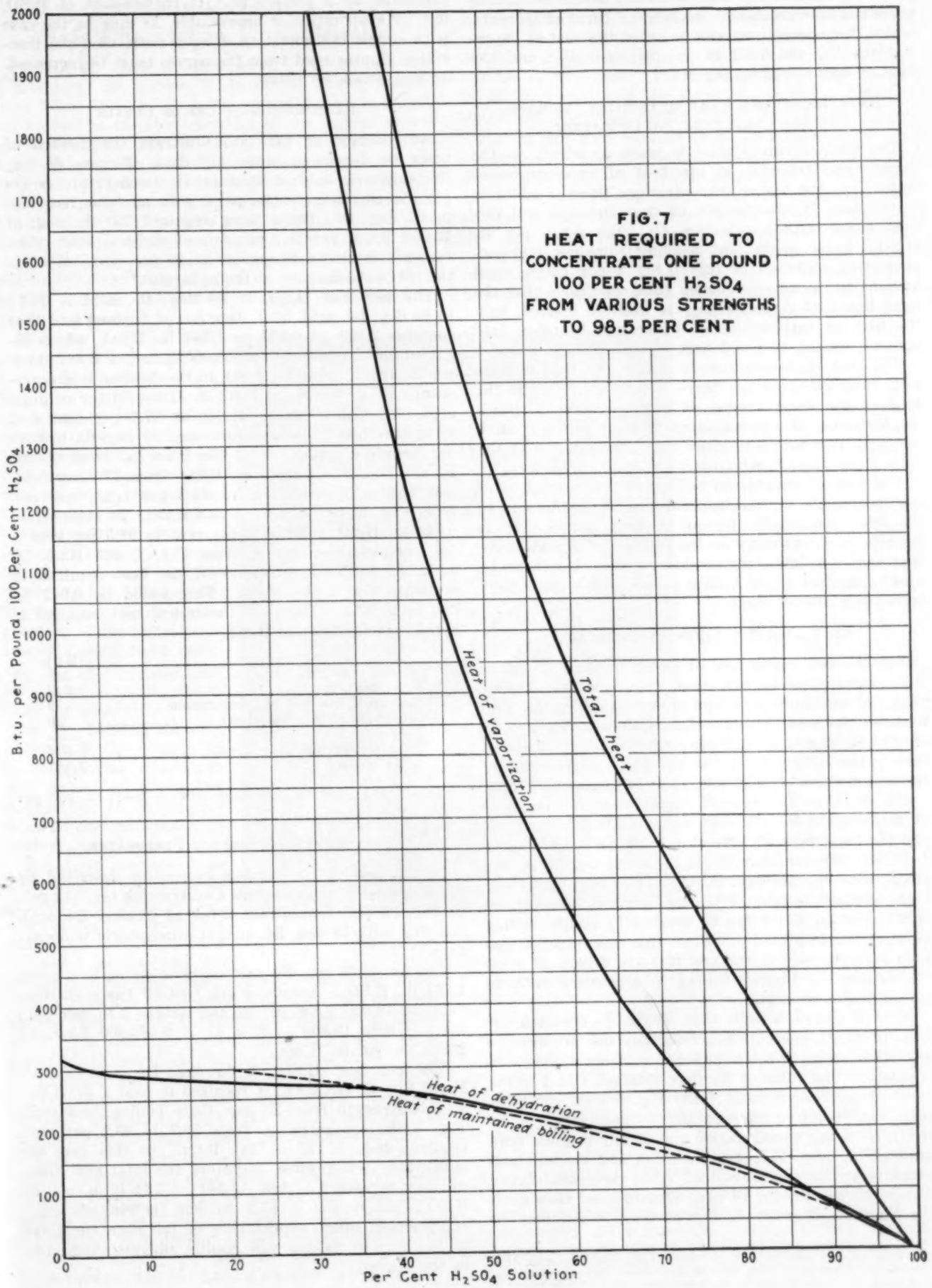


FIG. 7
HEAT REQUIRED TO CONCENTRATE ONE POUND 100 PER CENT H_2SO_4 FROM VARIOUS STRENGTHS TO 98.5 PER CENT
B.t.u. per Pound. 100 Per Cent H_2SO_4
Per Cent H_2SO_4 Solution
Total heat
Heat of vaporization
Heat of dehydration
Heat of maintained boiling
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
100

proper to regard the heat necessary after the boiling point has been reached as made up of three components, which, for convenience, can be called the heat of vaporization, H_v; the heat of dehydration, H_d; and the heat of maintained boiling H_b.

Analysis of the Heat Quantities Involved in the Concentrating Operation

The heat of vaporization is made up wholly, at the lower concentrations, of the heat of vaporization of water. At the higher concentrations there is added to it the heat of vaporization of the sulphuric acid carried along with the water—viz., 220 B.t.u. per lb. H_2SO_4. Since in the best designed sulphuric acid concentrating units all of this H_2SO_4 vapor but a small amount is recondensed under such conditions that the heat liberated in condensing is usefully applied, only the heat of vaporization of water will be taken into account, except as noted later.

The heat of dehydration is simply the heat of dilution reversed—that is, there must be put into the solution the same amount of heat, in order to break up hydrates, in concentrating from a per cent to b per cent, that would be given up by the dilution of the same quantity of H_2SO_4 from b per cent to a per cent.

The heat of maintained boiling is the summation of the increments of heat necessary to raise the acid to its new, continually higher, boiling points. It is sensible heat, evaluated as the product of a continually decreasing weight, temperature increments between continually increasing boiling points, and a continually decreasing specific heat.

Heat Required Shown Graphically

For the convenient use of designers and operators these various values have been calculated over a wide range of concentrations and shown graphically. Fig. 6 shows the sensible heat, H_s, required to bring 1 lb. of 100 per cent H_2SO_4 at any strength from any temperature to the boiling point. It has been calculated using the dotted curve of Fig. 1 and the full curve of Fig. 2.

Fig. 7 shows the heat of vaporization H_v, the heat of dehydration H_d, the heat of maintained boiling H_b, and the total heat H_t, the sum of H_v, H_d and H_b, for 1 lb. of 100 per cent H_2SO_4 concentrated from any strength to 98.5 per cent H_2SO_4. This latter figure has been selected because it is the highest strength of H_2SO_4 solution which can be reached by simple boiling at atmospheric pressure. When this concentration has been reached, both H_2SO_4 and H_2O are driven off from the solution by further boiling in a constant ratio to maintain this strength.

It is of course obvious that H_t can be obtained for 1 lb. of H_2SO_4 concentrated from any one strength to any other strength below 98.5 per cent, by simple subtraction.[10] The value of H_t thus obtained added to the value of H_s read directly from Fig. 6 then gives the total heat required theoretically to concentrate 1 lb. H_2SO_4 from any concentration and at any original temperature to any other concentration and boiling temperature at that concentration. This theoretical figure divided by the amount of heat actually used then gives the thermal efficiency of the process, which may be expressed as a percentage. If the amount of H_2SO_4 lost by evaporation is appreciable, as may be the case with simple concentration in open pans, then the theoretical figures read from the curves must be increased, as will be shown below.

[10] It is noteworthy that the curve H_t is practically a straight line from 65 per cent to 98.5 per cent H_2SO_4 and therefore that less than a 2 per cent error will be introduced by assuming that 23.3 B.t.u. is required per lb. of H_2SO_4 per per cent difference in this range.

Illustration of Use of Curves

An example or two will illustrate the method of using the foregoing curves and data. Suppose 60 deg. Bé. sulphuric acid at atmospheric temperature is being concentrated in open pans, with no fume recovery, to 66 deg. Bé., there being required 500 lb. coal, of 13,000 B.t.u. per lb., per ton of finished acid. The recovery is known to amount to 96 per cent. What is the thermal efficiency of the apparatus?

The per cent H_2SO_4 in 60 deg. Bé. acid is 77.7; in 66 deg. Bé. acid, 93.2 One ton of finished acid thus contains $2,000 \times 0.932 = 1,864$ lb. H_2SO_4, which required $500 \times 13,000 = 6,500,000$ B.t.u., or 3,487 B.t.u. per lb. H_2SO_4. One lb. H_2SO_4 in the finished acid corresponds to $1 \div 0.96 = 1.042$ lb. H_2SO_4 in the original acid. To heat 1.042 lb. H_2SO_4 as 77.7 per cent acid from atmospheric temperature, say, 20 deg. C., to boiling, requires, from Fig. 6, 194 B.t.u. $\times$ 1.042 = 202 B.t.u. To concentrate 1 lb. H_2SO_4 from 77.7 per cent, and boiling temperature, to 93.2 per cent, requires, from Fig. 7, 465 — 122 = 343 B.t.u. To concentrate 0.042 lb. H_2SO_4 from 77.7 per cent to 98.5 per cent—i.e., completely—requires, from Fig. 7, 465 B.t.u. $\times$ 0.042 = 20 B.t.u., exclusive of the heat required to volatilize the H_2SO_4 itself. This would be $0.042 \times 220 = 9$ B.t.u. The total theoretical heat required is hence, per lb. finished H_2SO_4,

	B.t.u.
Sensible heat, H_s	202
Total heat, H_t	343
Heat in H_2SO_4 lost by evaporation	9
Total heat of this lost H_2SO_4	20
Total theoretical	574
Actually used	3,487

Theoretical thermal efficiency $574 \div 3,487 = 16.5$ per cent.

Application to Surface Evaporator

In the case of the surface evaporator described by Mr. Gilchrist of the Chemical Construction Co.,[11] 11 gal. of fuel oil will concentrate 1 ton of 66 deg. Bé. acid, starting with 55 deg. Bé. acid at atmospheric temperature.

One ton of 66 deg. Bé. acid contains, as we have seen, 1,864 lb. H_2SO_4. Assuming the fuel oil has a thermal value of 18,000 B.t.u. per lb. and weighs 8 lb. per gal., there is used $18,000 \times 8 \times 11 = 1,584,000$ B.t.u., or 850 B.t.u. per lb. H_2SO_4.

The per cent H_2SO_4 in 55 deg. Bé. acid is 69.7 From Fig. 6, 193 B.t.u. is required to heat 1 lb. H_2SO_4 at this strength from 20 deg. C. to boiling, and from Fig. 7 the concentration from 69.7 to 93.2 per cent requires 663 — 122 = 541 B.t.u. In this case the H_2SO_4 lost is negligible, therefore the total heat theoretically necessary is 193 + 541 = 734 B.t.u. per lb. H_2SO_4. $734 \div 850 = 86.3$ per cent thermal efficiency.

Numerous other applications of the data contained in the various figures will readily suggest themselves to the reader.

[11] *Chem. & Met. Eng.*, vol. 26, p. 1159.

Edwin F. Ladd, Sole Chemist in U. S. Senate

AFTER 36 years of active work in a chemical laboratory, Dr. Edwin F. Ladd, the junior Senator from North Dakota, is having some difficulty in adjusting himself to the slow grinding of the legislative mill in Washington. For 20 years Dr. Ladd has been engaged in active hostilities in connection with the enforcement of North Dakota's laws pertaining to pure foods and materials. During most of that time he has had from one to three libel suits pending against him, to say nothing of injunctions and other efforts made to discourage him in his determination to obtain compliance with the laws of his state—a course in which he has had the active co-operation of most manufacturers and dealers.

While Dr. Ladd has good reason to know that obtaining national legislation is a long-drawn-out process, he is displaying in Washington the same perseverance that characterized his work in North Dakota. In addition to doing his part in the disposal of each day's legislative grist in the Senate, he is bringing to bear all the pressure in his power on his bills providing for such things as the adoption of the metric system, the compulsory working of patents and the setting up of purity standards for paints.

As Dr. Ladd is the only chemist in the Senate, he is being called upon more and more for advice and suggestion in connection with legislation dealing with chemical matters.

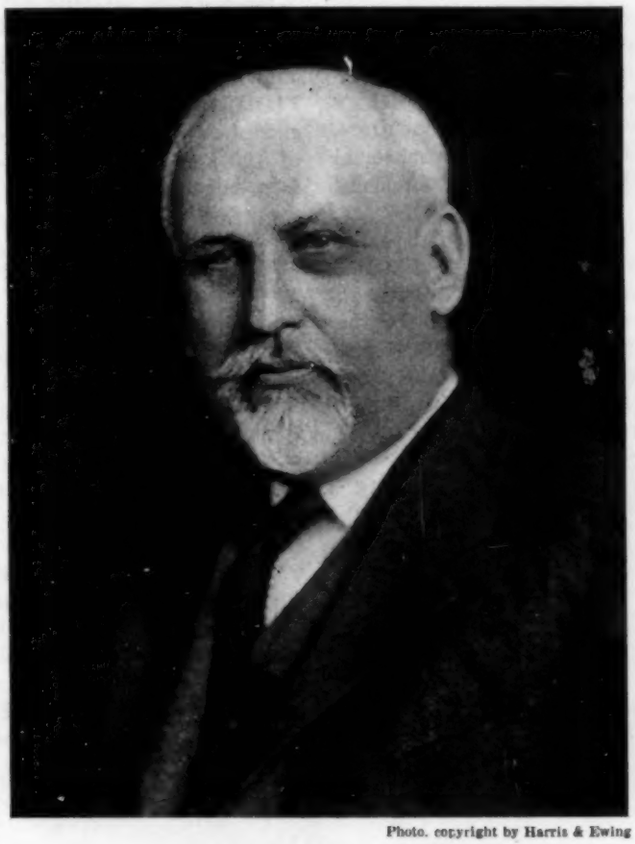


Photo. copyright by Harris & Ewing

SENATOR EDWIN F. LADD

Dr. Ladd specialized in chemistry at the Somerset Academy at Athens, Me., and in the University of Maine, the two institutions in which he received his education. He was graduated from the latter institution in 1884 and immediately took a position as chemist for the New York State Experiment Station at Geneva, N. Y. He held that position until 1890, when he was called to the North Dakota Agricultural College to act in the dual capacity of professor of chemistry and chief chemist of the State Agricultural Experiment Station. Despite the fact that he has been in Washington constantly for 2 years, he continues to this day to hold title to both those positions. In 1915 he was elected president of the North Dakota Agricultural College. During the war he was Federal Food Administrator for his state. In that position he came in close contact with Herbert Hoover—a relationship which is being continued now that Mr. Hoover is a member of the Cabinet and Dr. Ladd a member of the Senate.

For many years Dr. Ladd has been an active member in the Association for the Advancement of Science, in the Society for the Promotion of Agricultural Science, in the Association of Official Agricultural Chemists, and in the Association of Dairy, Drug and Food Officials. He has served each of the latter two organizations as president. For many years he has maintained membership in the American Chemical Society and in the American Public Health Association.

Just at this time Senator Ladd, as a member of the Committee on Agriculture, is making an intensive study of the Muscle Shoals project. Regardless of the policy which the government may adopt in regard to the disposal of its properties there, Senator Ladd recognizes that this power project will be the center of a great chemical industry. He wants to see that great water power put to use at the earliest possible moment. He is perfectly willing for the government to go ahead and complete the dam and then dispose of the power in a businesslike manner to private consumers, since it is apparent that delays will intervene before an agreement can be reached for the disposal of the property to private interests.

When Dr. Ladd came to Washington he thought the government should undertake the operation of the nitrate plants. His observations since, however, have convinced him that the government would not be efficient in the conduct of a chemical manufacturing plant and he believes the government plants should be leased to the highest bidder. He would like to see some one give the government more than Henry Ford has offered, but if no one is willing to make a better offer than Mr. Ford, he believes that Congress can exact certain practical limitations which will permit the country to have the advantages from that great natural resource.

In concluding this brief biography it is fair to point out that many of the legislative proposals of the distinguished senator from North Dakota are not in accord with our editorial policies. On several occasions in the past we have been forced to criticize rather severely Senator Ladd's stand on the soldier bonus. His abortive proposal to enact a specific and burdensome tax on banking institutions is not likely to receive serious consideration by Congress, but certainly to our way of thinking it marks a trend in a very dangerous direction. The potential power in the hands of the farm bloc is a problem viewed with apprehension by all who are mindful of the future legislative program of this country. The chemical industry at this time is vitally concerned with national legislative problems and it is to be hoped that Senator Edwin F. Ladd will make the most of his unique opportunity to champion the cause of chemistry in America.

Fiat Electric Steel Furnace

By Dr. Alfredo Stromboli
Turin, Italy

STUDIES on the new Fiat electric furnace, originated by Cav. Masera, manager of the steel foundry at the Fiat Works, Turin, were begun in 1916. In September, 1917, furnaces of the 5- and 6-ton types were put into operation. After improvements in details and in view of the most excellent results obtained, all the other steel furnaces in the foundry were replaced by this new type, six being constructed of 5 to 6 tons capacity, and a small one of 1½ tons capacity.

The Fiat furnace is a "fast" furnace and of large output, and is characterized by a perfectly tight roof maintained by means of a special economizer to be described. As will be seen from Fig. 5, the furnace consists of a cylindrical steel plate shell, properly reinforced, having a hemispherical bottom to which are attached two circular shoes of cast steel which permit the whole unit to be rotated in either direction by suitable hydraulic pistons. The shell and the refractory material with which it is lined have only two openings. One larger one serves for charging with the material and for removing the slag; the other, directly opposite to the first, for pouring.

Fig. 5 clearly shows heavy steel lugs attached to the sides of the casing into which fit the pintles of a lattice framework. This frame forms a sort of overhead bridge to the furnace and serves as a support for the entire upper mechanism, composed as a whole of the three economizers or electrode-carriers. Economizers constitute the characteristic and essential part of this furnace; they insure that the roof is hermetically sealed around the electrodes, and absolutely prevent any escape of gas or flame through the openings.

Fig. 2, on page 30, shows a section of the furnace, with an enlarged section of the Fiat economizer. It is composed of a cylindrical water pocket *A*, through which the electrode passes. A series of insulating rings are provided inside this cylinder, serving as guides to the electrode during its movement and keeping it from contact with the metallic wall. In the upper part, a circular layer of asbestos *C*, held in place by a metallic ring, is provided, acting as a packing ring in which may glide a sealing bell, formed of a cylinder of copper attached to a steel disk *B*, forming the cover. This cover has a hole in the center for the passage of the electrode and at the sides are two lugs with screw thread for the raising and lowering machanism. On this cover is located an insulating disk *E* and on this, by means of suitably insulated bolts, is secured the bronze clamp *F*, which grips the electrode. The latter, together with its clamp, is thus solidly connected with the bell, the purpose of which is to obtain a hermetic seal about the electrode by means of the packing rings on which it glides, thus absolutely preventing the circulation of air through the furnace.

All those parts form a complete unit which can be placed on the furnace and removed with great ease by means of a crane and without interrupting the operation of the furnace, as is shown in Fig. 5.

As a result of this hermetic seal, oxidation of the electrode is prevented, and electrode consumption is greatly reduced. Butt ends may be used to the last, as shown in Fig. 3, showing an electrode removed from a Fiat furnace after twenty-one heats of 5 tons each. The end piece was originally 1½ meters long, with a weight of 120 kg. After twenty-one pourings it was reduced to a length of 25 cm. with a weight of 20 kg., the consumption (counting all three electrodes) being

$$\frac{100 \times 3}{21 \times 5} = 2.85 \text{ kg. per ton.}$$

Since this seal prevents any and all circulation of air in the furnace, the atmosphere above the bath is kept constantly neutral. This circumstance enables us to dispense with the use of cast iron or other carbonizing agent in the charge. The cross-section of the electrodes remains unaltered; therefore the furnace may be speeded up, putting into it a large amount of energy, employing larger cables, electrodes of larger cross-section and transformers of greater capacity. The effects of the short-circuits which take place in the furnace are rendered negligible in practice by a well-proportioned transformer, by properly calculated distribution mains and by the adoption of a single conductor.

Fig. 4 represents the general arrangement of the electrical equipment of a Fiat furnace. It is apparent that it is a three-phase furnace with three electrodes

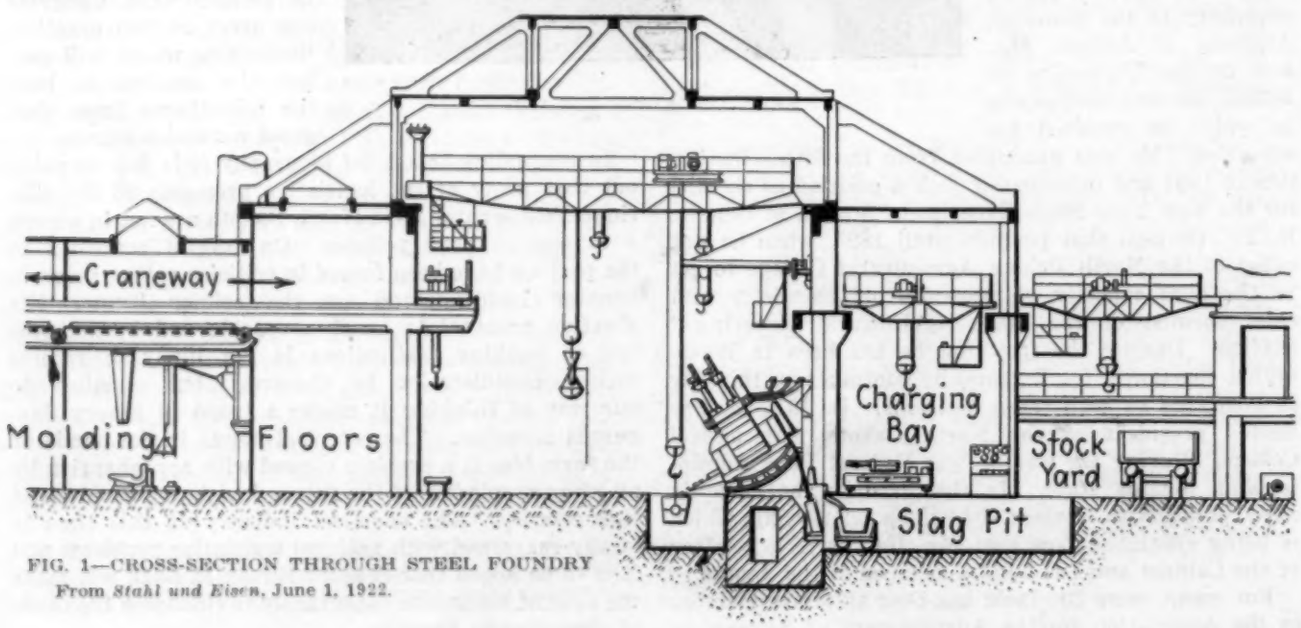
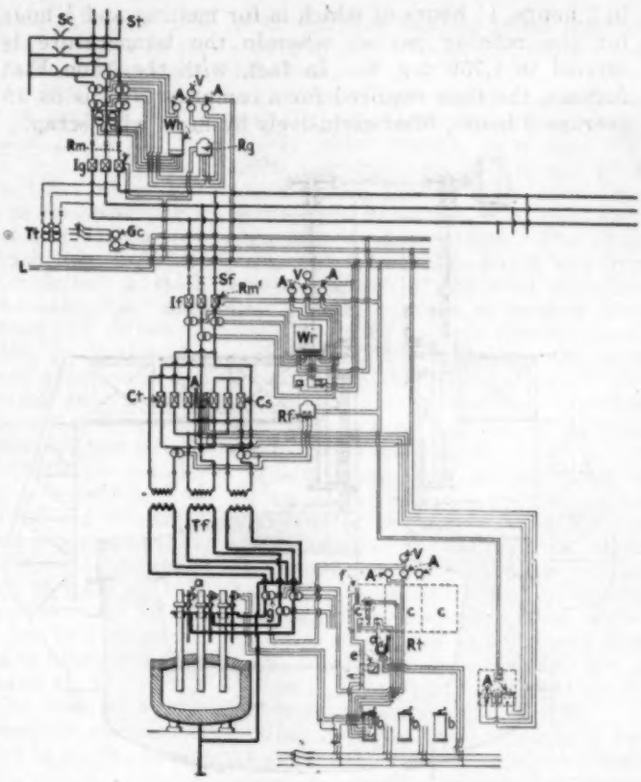


FIG. 1—CROSS-SECTION THROUGH STEEL FOUNDRY
From *Stahl und Eisen*, June 1, 1922.

arranged vertically above the bath in such a way that the arc is made directly on the metal.

FIG. 4—WIRING DIAGRAM

Sg—Main line.
Sc—Lightning arresters, Gola type with oil resistances.
Ig—Main automatic circuit breaker, oil type.
Rg—Quick-break relay, upper limit for *Ig*.
Rm—Quick-break relay, lower limit for *Ig*.
Wh—Main wattmeter.
Tt—Transformer for feeder to auxiliary apparatus.
Gc—Alternating to continuous current, converter for feeding continuous current.
La—Line of single phase alternating current, extraneous source for check on wattmeters.
Sf—Branch lines to the furnace.
f—Automatic circuit breaker, oil type, on lines to furnace.
Rf—Quick-break relay, upper limit for *If*.
Rm—Quick-break relay, lower limit for *If*.
Wr—Wattmeter, charging furnace.
{ *Ct* } —Group of circuit breakers, oil type, for commutation to Δ or Λ primary.
{ *Cs* }
A—Apparatus operating the commutators with distant control by direct current.
Tf—Three-phase transformer Δ and Y with neutral voltage 120 and 70, natural cooling in oil type.
Rt—Assembly of the automatic regulators for operating the furnace at constant intensity.
a—Motors operating the moving mechanism of the electrodes.
b—Controllers for operating motors *a* by hand in starting the furnace.
c—Thury regulators.
d—Motor for operating the regulators.
e—Additional resistance for regulation.
f—Electromagnet for regulating clutch.
g—Current transformers for feed to electromagnet *f* and ammeters.



High tension current (21,000 volts used at Turin works) is directly transformed to 120 or 75 volts by means of a static transformer, using oil and natural cooling. The whole electrical equipment has been calculated on the basis that a charge may be completed

FIG. 3—NEW ELECTRODES JOINED TO A BUTT

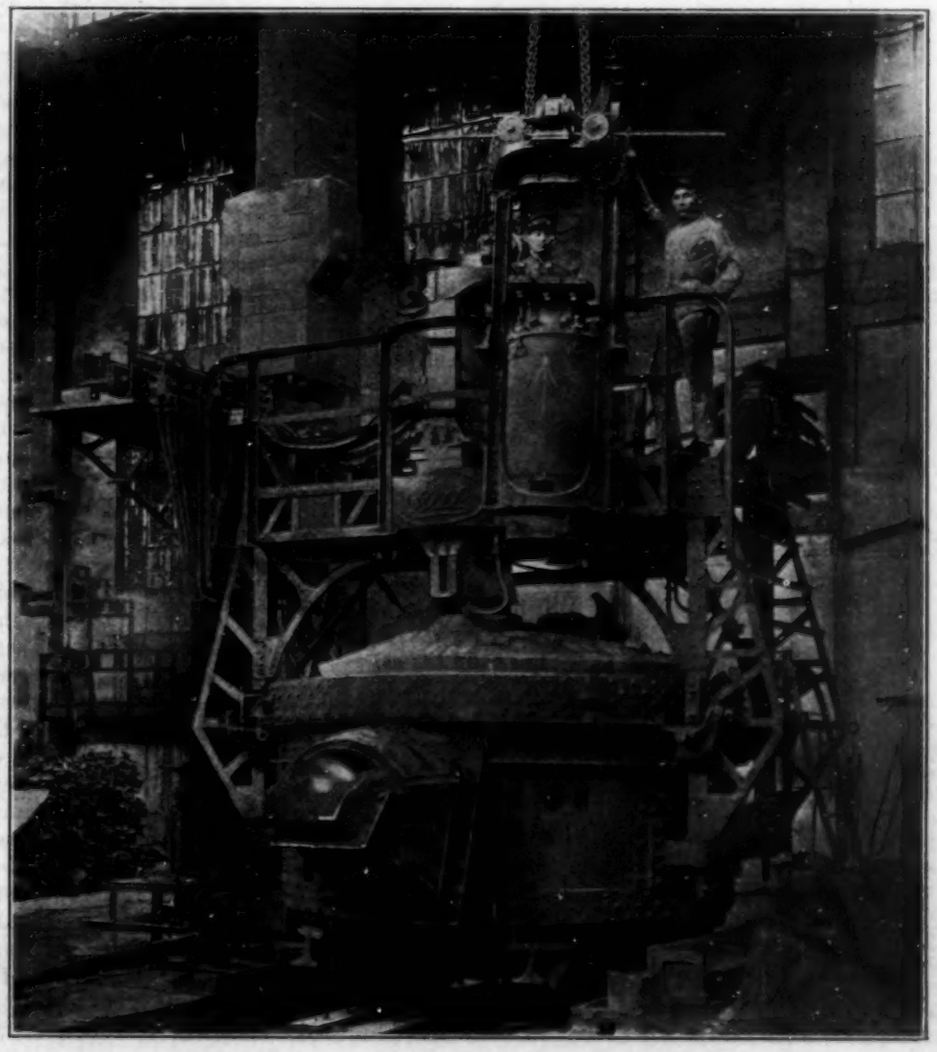
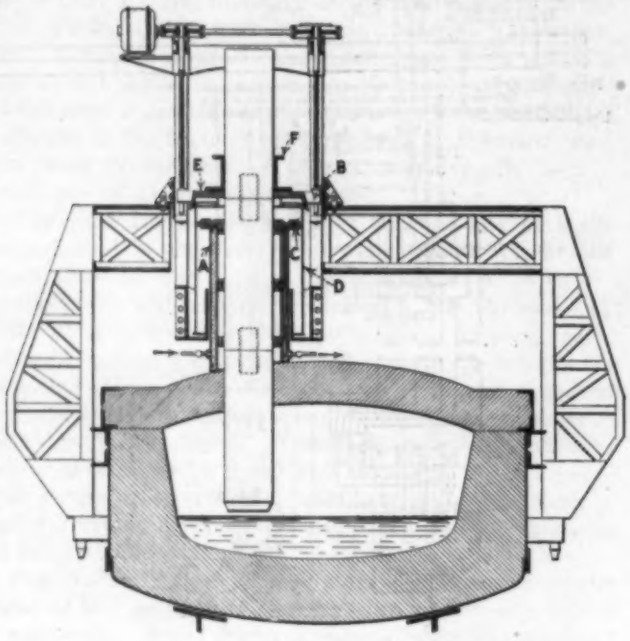


FIG. 5—PLACING AN ECONOMIZER ON A FIAT FURNACE

in 2 hours, 1½ hours of which is for melting and ½ hour for the refining period, wherein the temperature is carried to 1,750 deg. C. In fact, with the 5-ton Fiat furnace, the time required for a complete cycle is on an average 3 hours, filled exclusively by hand with scrap.



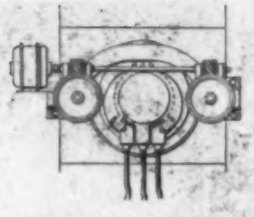


FIG. 2—DIAGRAM OF ECONOMIZER. (FURNACE LINES NOT DRAWN TO SCALE)

A power consumption test taken May 10, 1921, on furnace 6 (5 to 6 tons capacity) in the steel foundry of the Fiat works of Turin in the presence of several foreign metallurgical specialists gave the following results:

Beginning at 8:20 a.m., at the end of charge 56 and ending the next morning at the same hour with charge 65, exactly 24 hours was required for nine charges, including the time to fill by hand. Each charge consisted of 4,675 kg. of scrap without additions. The average time for each operation was 2.40 hours, in which the current was on 2.10 hours and ½ hour was used for charging.

Power consumption, measured by a watt-meter, totalled 25,100 kw.-hr. For 4,675 kg. × 9 × 0.94= 39,500 kg. of steel poured gives a consumption of less than 640 kw.-hr. per ton of steel cast.

How Much Steel in an Automobile?

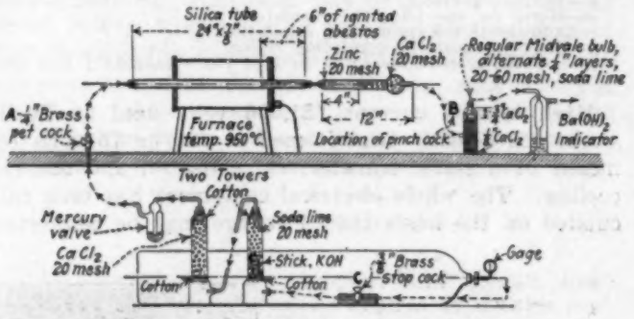
The burden the automobile industry places upon other industries is frequently overestimated. On an average, not much more than 1000 pounds of finished rolled steel is consumed per passenger automobile. Using round and conservatively high figures, taking 1200 pounds per passenger car the May production of passenger cars represented 125,000 gross tons of finished rolled steel, while the total production was about 2,350,000 gross tons. Automobiles, trucks, repairs and accessories hardly absorbed more than 7 per cent of the steel production last month.

Simple, Foolproof Carbon Combustion Apparatus

BY WILLIAM KUEBLER

In the accompanying figure is shown a carbon combustion apparatus which has proved to be simple in operation and practically foolproof.

Determinations are made with full or one-half factor samples (20-mesh) using zirconia boats and 90-mesh R.R. alundum bed. A Davis-Bournonville gage on the oxygen tank is set so that the required rate of flow (200 to 250 bubbles per minute) is maintained. Once set, this gage is never touched until the tank is empty. When the apparatus is not in use, the supply of oxygen is shut off by means of stopcock *C*.



CARBON COMBUSTION APPARATUS

Having regulated the flow of gas, the pinch-cock *B* is closed, the stopper removed from tube and stop-cock *A* is closed. The boat with sample is then inserted in tube, tube closed and sample allowed to soak for 3 minutes. Meanwhile, the Midvale absorption bulb is weighed and connected. At end of 3 minutes open *A* and then pinch-cock *B*. Oxygen is allowed to flow for 7 minutes, this ordinarily being sufficient time for complete combustion. When oxygen first enters the tube and combines with the carbon and iron the flow is appreciably diminished, as will be shown by the indicator bottle. When the reaction is complete the flow of gas resumes its normal speed.

At the end of the 7 minutes remove the Midvale bulb, close pinch-cock *B*, remove stopper, close stop-cock *A* and remove boat. Immediately insert new sample, close tube and allow to soak the required 3 minutes while weighing bulb.

It has been the author's experience that the gage and a mercury valve give more consistent pressure than a water pressure tank and also eliminate the continual changing of the pre-purifying train due to moisture carried over with the oxygen. With the apparatus described, renewals of the pre-purifying train are made about every 6 months; of the zinc and calcium chloride tubes about every month. Renewals are governed by the number of determinations made and the behavior of standards run at the beginning, middle and end of each day's run.

The two towers shown supply five combustion trains, the division being made after the oxygen leaves the mercury valve. Arrows indicate tubing required and direction of current of oxygen. The rate of flow of oxygen is 200 to 250 bubbles per minute, which is sufficient if tubes, etc., are properly packed.

Synopsis of Recent Chemical & Metallurgical Literature

Dyes and Coal-Tar Chemicals in 1921

Tariff Information Series No. 25, recently published by the United States Tariff Commission, is a preliminary summary of the "Census of Dyes and Coal-Tar Chemicals, 1921," which has been prepared with the assistance of Warren N. Watson and C. R. DeLong for the use of the Senate Finance Committee. The report indicates that the total production of intermediates in 1921 by 107 different manufacturers was 70,899,912 lb., a decrease of 73 per cent in quantity from the 1920 output. The total sales in 1921 were 33,637,326 lb., valued at $8,483,463.

The number of intermediates reported in 1921 was 232, as compared with 236 in 1920. Of the total number reported in 1921, 49 were reported for the first time. The commission points out that the large decrease in the 1921 production of intermediates may be attributed to the following causes: (1) The loss of most of our export trade in dyes, (2) the large stocks carried over from the previous year, and (3) the general business depression. In general the intermediates used in producing those dyes consumed in the largest quantity show the most reductions.

DYES AND OTHER FINISHED PRODUCTS

Dyes — The domestic production of dyes in 1921 by 74 manufacturers totaled 39,008,690 lb., a decrease of 56 per cent from that of 1920. The sales during 1921 totaled 47,513,762 lb., with a value of $39,283,956. The sales exceeded the production by 22 per cent, indicating that a part of the domestic consumption for that year was supplied from stocks carried over from the previous year's abnormal production. The average sales price of dyes for 1921 was 83c. per lb., compared with $1.08 for 1920 and $1.07 for 1919.

The production of dyes in 1921, grouped by classes according to method of application, is as follows: Acid dyes, 7,751,698 lb., or 19.87 per cent of the total production; basic dyes, 1,852,243 lb., or 4.75 per cent; direct cotton dyes, 6,787,634 lb., or 17.4 per cent; sulphur dyes, 10,239,255 lb., or 26.25 per cent; vat dyes, including indigo, 7,019,120 lb., or 17.99 per cent; the vat colors being divided as follows: Indigo, 6,673,968 lb. and other vats 345,152 lb.; mordant and chrome colors, 3,773,438 lb., or 9.67 per cent; lake and spirit soluble dyes, 697,444 lb., or 1.79 per cent; unclassified dyes, 887,858 lb., or 2.28 per cent.

Color Lakes—The total output by 43 firms of this class of pigments was 6,152,187 lb., compared with 10,983,538 lb., valued at $5,871,820 in 1920. Total sales of color lakes for 1921 amounted to 6,424,612 lb., valued at $2,863,189.

Photographic Chemicals — The production by 5 firms of these coal-tar chemicals used as photographic developers totaled, in 1921, 183,798 lb. compared with 440,759 lb. in 1920. Sales during 1921 amounted to 170,221 lb., valued at $248,041.

Medicinals—During 1921 conspicuous progress was made in the development of synthetic medicinals of coal-tar origin. The total production for 1921 was 1,545,917 lb., including a small quantity of disinfectants, the sales amounting to 1,876,246 lb., valued at $2,930,324. The 1920 production, including a considerable quantity of disinfectants, was 5,184,989 lb., valued at $5,726,776. Total production figures for 1920 and 1921 are, however, not strictly comparable, due to the large quantity of disinfectants of a relatively low value reported in 1920 and the small quantity of this group reported in 1921.

Perfumes and Flavors — The total output of flavors by 17 firms in 1921 was 901,245 lb., compared with 166,884 lb. in 1920. Sales for 1921 amounted to 933,662 lb., valued at $1,002,018. The production of perfumes by 15 firms in 1921 was 119,335 lb., compared with 99,740 lb. for the previous year. Sales in 1921 amounted to 119,691 lb., valued at $175,815.

Synthetic Phenolic Resins—These products are used as substitutes for amber in making pipestems and similar articles, electrical insulators, varnishes and lacquers. The 1921 production by three firms was 1,643,796 lb., compared with a production of 4,659,680 lb. during the previous year. Sales in 1921 amounted to 1,674,456 lb., valued at $1,352,166.

Synthetic Tanning Materials—The output of these products by four firms amounted to 1,902,597 lb. in 1921, compared with 3,142,861 ib. in 1920. The sales were 1,721,359 lb., valued at $141,005, during 1921.

Mechanical Handling of Superphosphate

In a recent issue of *Chemical Age* (London) George Frederick Zimmer presents a paper under this title which describes an installation for this purpose and built by S. S. Stott & Co., of Haslingden, England.

As should be well known, superphosphate is manufactured as follows: The ground phosphate rock and a certain amount of sulphuric acid are passed through a mixing machine which stands on a floor above the dens or cellars in which it must lie for some time to mature. After this mixing, the substance is permitted to run by gravity into one of the dens. Large wooden doors are provided for these dens, which are placed in position before they are filled, and when one of the dens is ready for discharging, the door is lifted away bodily, in modern plant, by a small overhead crane. Previous to the adoption of the mechanical handling devices which form the subject of this essay, the super-phosphate had to be cut from the pile in the dens by a gang of men with spades, shovels and wheelbarrows.

The mechanical excavator consists essentially of a carriage with flanged wheels which travels on a steel rail track reaching from end to end of a series of two, three or more dens. Superimposed upon this is a mild steel structure on a turntable. The excavator arm is located in such a way in a central position of the steel structure that it may be raised or lowered relative thereto as well as rotated therewith. With this provision the arm which carries the moving scrapers can be swung into the requisite position and made to enter any one of the dens (in this case only two).

The scraper arm is driven by a 7-b.h.p. electro-motor, supported on the inner end of the arm—i.e., within the steel structure—and the motor is raised or lowered vertically with the scraper arm. The scraper proper is an endless running chain conveyor fitted alternately with stirrers and prongs. The cantilevered arm is suspended by a cast-iron yoke from steel wire ropes and counterbalanced by a weight.

When a den is to be discharged, the door is removed by a small overhead crane; the scraper arm is then raised to its highest position, in which it is introduced into the den and started to work, cutting a slice of superphosphate a few inches deep from the top of the bed; when the material is thus raked out, it falls upon the tray conveyor in front of the dens. When the excavator has traveled laterally across the top of the deposit reaching the other wall, an automatic gear lowers the scraper arm a few inches and simultaneously reverses the motion of the machine, thus commencing another cut of the bed on its return travel. This operation is repeated until the den is empty.

It will be noticed that during these reciprocating journeys from side to side of the den the excavator travels alternately in the same and then in the reverse direction with the tray conveyor. When the former is the case the amount of superphosphate deposited into each individual tray of the conveyor is much greater than when the excavator travels in the reverse direction of the conveyor. It was, therefore, necessary to construct the tray conveyor for a maximum capacity, and it is, therefore, 24 in. wide.

On reaching the end of the tray conveyor the superphosphate is delivered to the boot of an inclined bucket elevator, 37 ft. long from center to center, with malleable cast-iron buckets 18 in. wide, by which it is lifted and delivered into tip wagons on the floor above the dens for conveyance on an overhead track to an adjoining shed to be stored.

The conveyor is 41 ft. 6 in. long from center to center, and 24 in. wide; it is carried on a single strand of No. 600 Ley's bushed chain, each tray having a mild steel axle with two cast-iron trodwheels. The inclined elevator carries buckets at a pitch of 18 in. which are

attached to a double strand of the same chain as the conveyor.

The electro-motor is one of 30 hp., and drives the mixer, the drag chain for traveling the excavator, as well as providing power for the tray conveyor and bucket elevator.

The two dens are 16 ft. wide each, they have a depth of 17 ft. from the open front to the back wall and are 18 ft. high from floor to ceiling. Their capacity is 50 tons each, which quantity can be removed by the plant in 2 hours. A very considerable saving of onerous labor is therefore effected by this installation, as almost the entire manual labor is deleted, with the exception of attendance.

Structure of Pearlite

A paper entitled "Inner Structure of the Pearlite Grain" was presented before the May, 1922, meeting of the Iron and Steel Institute by Colonel N. T. Belaiew. He assumes that in well-made steels, very slowly cooled through the transformation range, the austenite breaks up into parallel flat films of ferrite and cementite, the former about three times as thick as the latter. Under these circumstances all ferrite films are thought to be of substantially the same thickness in the same grain and in fact throughout the same piece of steel.

Granting these premises, the apparent distances between the fine workings in well-developed pearlite will depend upon the angle which the polishing plane makes with the crystalline plates comprising the grain. The finest, closest markings will represent the actual thickness of the plates, for that grain was cut normal to the structure. As the angle becomes less the pearlite appears coarser and coarser. As the angle between the films and plane of polish becomes less than 10 deg. the intersections become frayed during cutting or polishing so that the appearance of lamination vanishes.

Measurements on several steels showed that cementite lamellæ in "five lamellar and sorbitic" steel is about 25$\mu\mu$ thick. "Exceptionally coarse" pearlite has cementite plates about 300$\mu\mu$ thick. In both cases their adjacent ferrite plates are assumed to be three times as thick.

Cyanide From Calcium Cyanamide

Horace Freeman, in an interesting paper recently presented before the Chemists' Committee, Advisory Research Council in Ottawa, and published in the June issue of *Canadian Chemistry and Metallurgy*, describes the early development and later successful production of sodium cyanide from lime nitrogen (crude calcium cyanamide). The process now used at Niagara is carried out by mixing raw lime nitrogen, rock salt and calcium carbide. This mixture is fed into large crucible-shaped electric furnaces, lined with carbon blocks. The furnaces are wide at the top and constricted at the bottom, having a single centrally hung graphite electrode 12 in. in diameter, the lower end of which is about 12 in. from the bottom of the crucible. This is also electrically connected. Single-phase current is used. A tap hole leads from the extreme bottom of the crucible and is closed with an iron plug on a long rod.

The furnace is filled with raw materials to a depth of several feet, and as no foaming takes place and all heat is generated at the bottom, no gases or flames escape from the top of the furnace and the intense heat of the operation is not apparent until the furnace is tapped. A very high current density is employed so that the heating of the mixture between the electrode and the bottom of the furnace is extremely rapid. As the mixture melts the conductivity rapidly increases and the current correspondingly increases. When the current reaches a certain fixed upper limit, corresponding to a known temperature of the fused cyanide inside the furnace, the tap hole is opened by withdrawing the plug. The fused material flows down a conduit to a sump, from which it is rapidly taken up and cooled from its temperature of over 1,300 deg. C. by means of a rotating steel wheel having continuous water circulation through hollow shaft and rim. The temperature is reduced to a black heat by this means in a few seconds. The material is removed in the form of thin flakes by a scraper and packed in sheet iron or steel drums.

In the earlier experiments which Mr. Freeman had conducted at Vancouver, approximately 90 parts of salt were used with 100 parts of lime nitrogen. The efficiency of nitrogen formation to cyanide was 94 per cent and the product contained up to 36 per cent of cyanide calculated as sodium cyanide.

After a batch of material is tapped from the furnace the superimposed layer of partly heated material falls down and takes its place. The electrical contact is not broken, so that the temperature again rapidly mounts and the operation is repeated. The furnace is thus kept under complete electrical and heat control, and is mechanically operated except for the necessary attendant for tapping, who watches the ammeter.

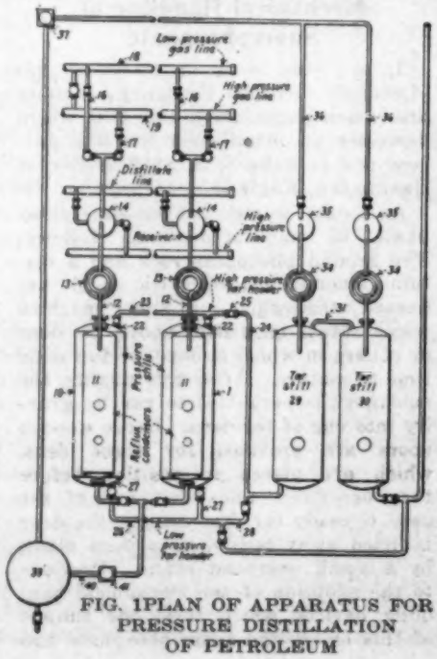


FIG. 1PLAN OF APPARATUS FOR PRESSURE DISTILLATION OF PETROLEUM

Recent Chemical & Metallurgical Patents

Pressure Distillation of Petroleum.—A continuous process of distilling petroleum oils under pressure is the subject of a patent by Edgar M. Clark, assignor to the Standard Oil Co. of New York. Briefly the process consists in operating simultaneously a battery of pressure stills and separately condensing and collecting the distillate of each still. The withdrawn condensate is taken off through a common drawoff line and distilled in an ordinary tar still. The product of this distillation is returned to the pressure stills and is supplemented by a sufficient quantity of fresh oil to maintain a constant level in each still. A feature of the pressure stills is that they are constructed so that a uniform pressure is maintained in all stills by permitting a free interflow of uncondensed distillation products between the stills.

The apparatus is shown in plan in the figure. The battery of stills, which in general would consist of six to twenty stills arranged in a row, is indicated in the figure by the two end stills 1 and 10. Each is equipped with its individual reflux fractionating condenser 11, from which the vapor line 12 of each still is led to a water-cooled condenser 13 and thence to a receiving drum 14 for the distillate. Each receiving drum is connected by branching valved pipes, 16 and 17, to low- and high-pressure gas mains designated 18 and 19.

At a point below the normal liquid level in each still, the particular point being determined by the form of still employed, there is a valved high-pressure tar draw-off as indicated at 22 on the drawing. These tar draw-off lines from the several stills are manifolded to a common high-pressure tar header 23. At the end of the battery this high-pressure tar header discharges into a low-pressure tar line 24 through a pressure release and control valve 25. A separate low-pressure tar header designated 26 extends along the battery and is provided with valve connections 27 for each still, these low-pressure tar connections being tapped into the lowest point in the still, so that the latter may be completely emptied through them. The low-pressure tar header 26 communicates with the tar line 24 through a valve connection 28.

The tar line 24 discharges into a continuous tar still 29. For continuous operation it is often preferable to have a second tar still 30 connected with

the first by means of the overflow connection 31. Each tar still is equipped with its separate condenser 34 and receiver 35. From the receivers, distillate lines 36 lead to a tar distillate pump 37, which discharges by the line 38 into the feed-stock tank 39. Into the latter there is connected a feed line 40 through a pressure feed pump 41.

In the present discussion it is not possible to include the details of operation, for which the reader should consult the original specification. In this connection, however, the following statement of the patentee is of sufficient interest to be quoted.

"I have found that by continuously withdrawing a portion of the material under treatment from the pressure stills and continuously feeding a sufficient quantity of fresh stock to maintain a constant level therein, it is possible to prolong the continuous period of operation of the stills to such an extent that the output of light distillate from the equipment is substantially increased. I prefer to operate by charging each still into the battery initially and running off by the batch method—that is, without either feeding or withdrawing tar—approximately 20 per cent of the contents of the still before putting the still into communication with the high-pressure tar header and beginning the feed. I have found it easily possible to operate stills in this manner continuously for a week at a time without interrupting the pressure process for the purpose of cleaning the stills." (1,410,797; March 28, 1922.)

Recovery of Tungsten Trioxide From Tungsten Ores.—Tungsten ores are first calcined with chloride or chlorate of an alkali or alkaline earth at bright red heat. After pulverization the mass is treated with mineral acid and the impurities separated from the residue. Ammonia is then added, again separated and the ammonia driven off. Calcination at red heat leaves pure tungsten trioxide. (1,410,584, Simon Lubowsky, assignor to Metal & Thermit Corp.; March 28, 1922.)

Recovery and Elimination of Waste Sulphur Gases.—Twelve claims, all bearing on the purification of sulphur-bearing gases and concentration of their sulphur content, are made by Melville F. Coobaugh, of Golden, Colo. The process is based upon the ready absorption of SO_3 by iron oxide, Fe_2O_3, the oxidation of SO_2 to SO_3, by oxygen in the presence of Fe_2O_3. Both these reactions take place at about 450 deg. C. The ferric sulphate so formed can then be heated out of contact with air at temperatures around 700 deg. C., when it gives up its SO_2 in concentrated form. This will have application in metallurgical work where a minimum content of sulphur in exit gases is required by law. It also gives an opportunity to recover in usable form the large quantities of waste sulphur gases. (1,412,452; April 11, 1922.)

Gas Producer.—William B. Chapman, of Mount Vernon, Ohio, has patented a gas producer in which the operations of feeding the fuel, spreading the fuel, agitating the top surface of the fuel and removing the ash are performed continuously, automatically and in synchronism with one another. It is claimed that by this means the gas making can be scientifically regulated. This work is performed in this producer without moving the walls, top, ashpan or other heavy and ponderous parts. It is claimed for this producer that the rate of fuel feeding, the thickness of the firebed and other conditions can be automatically regulated depending on the quality of fuel used and the rate of gasification desired. (1,412,921; April 18, 1922.)

Manufacture of Lithopone.—Formerly lithopone has been "muffled" in horizontal muffles, where poor control and uneven product result. Messrs. Singmaster and Breyer have passed the crude lithopone (zinc sulphide and barium sulphate mixture) through a vertical muffle 10 in. in diameter and 25 ft. long of wrought iron externally heated. In this apparatus the lithopone is first dried in the upper part of the tube and all the entrained air removed by the heat before it reaches the muffling zone. The tube dicharges directly into water. Continuous controlled operation is possible. They found the ratio of diameter to length very important, larger diameter giving uneven product. (1,411,696, Singmaster & Breyer, for New Jersey Zinc Co.; April 4, 1922.)

Vegetable Oil Extraction.—Hermann Bollmann, of Hamburg, has patented the application of the counter-current principle to the solvent extraction of oleagenous materials. The raw material is separated into batches and placed in receptacles provided with sievelike bottoms and open at the top. These are placed in the usual closed chamber in one direction and the solvent is caused to travel freely in the opposite direction consecutively through all receptacles, whereby the fat content of the solvent is progressively increased. This has the advantage of enabling loss of solvent to be avoided more efficiently and the passage through the material under extraction to be effected within the closed chamber from which the solvent vapors may be recovered and after condensation may again be utilized. (1,411,154; March 28, 1922.)

Manufacture of Soap—A quickly soluble white soap for laundry or toilet purposes is claimed to be made by a method which comprises disseminating a multitude of air bubbles throughout the soap while it is in a molten viscous condition and then diminishing the pressure under which the aeration took place so as to expand the air bubbles within the mass of soap. The puffed mass thus produced is permitted to cool and any excess moisture present is driven off so as to bring the product to the desired degree of dryness. (1,414,015, Truman, M. Godfrey, assignor to N. K. Fairbank Co. April 25, 1922.)

Book Reviews

ELEMENTARY CHEMICAL MICROSCOPY. By *Emile Monnin Chamot*. Second edition. New York: John Wiley & Sons, Inc. 479 pages, illustrated. Price $4.25.

This is a college text book on the use of the microscope in chemistry. The first part of the book contains descriptions of microscopes and accessories. This is followed by an explanation of microchemical technique, and finally by a detailed description of chemical reactions suitable for identifying the common elements under the microscope.

The author claims that microchemical methods have an enormous advantage over those of ordinary qualitative analysis in the saving of time, labor and material, as well as in the increased sensitiveness of the tests. In one of his lectures he illustrated the speed and sensitiveness of microchemical methods by describing the analysis of an antique coin. The edge of this coin was rubbed on a frosted glass plate, leaving a small mark. Part of the material in this mark was dissolved in a drop of acid. This drop was then split up into parts to which reagents were added, the reactions being observed under the microscope. In this way the composition of the coin was determined, the whole analysis requiring only twenty minutes.

The apparatus described in this book comprises chemical, metallurgical, petrographical, micrometer and ultramicroscopes and accessories. Elementary instructions are given for the use of each instrument. Critical comparisons are made of instruments designed for the same purpose, which makes the book valuable to refer to before buying microscopic equipment.

The most fascinating part of this book deals with microchemical technique. The author uses a microscope slide for a work bench. On this he places his microscopic fragments and drops of reagents, and performs the usual manipulations of qualitative analysis, such as solution, decantation, filtration, distillation and sublimation. In addition to chemical tests he uses melting points, refractive indices and polarized light phenomena in identifying microscopic materials and therefore devotes several chapters of his book to the description of these methods.

Following the explanation of microchemical technique is a detailed account of tests for each element. These tests differ from those of ordinary qualitative analysis in that they depend on the separation of crystals from relatively concentrated solutions, and afterwards identifying these crystals from their form, color and optical properties. It frequently happens that one reagent causes the separation of crystals characteristic of several elements at the same time. Each element can then be identified from its characteristic crystal

and this naturally results in a great saving of time and labor.

The book is thoroughly readable and authoritative in its field. After studying it under a figurative microscope the reviewer can only report that the examination merely corroborates the expectations that were aroused by the first glance at the title page which revealed the author's name. Dr. Chamot's work is worthy of his high position in his particular field.

OLIVER E. CONKLIN.

OIL SHALES. By *H. B. Cronshaw*, B.A., Ph.D., A.R.S.M. 80 pp., with map. London: John Murray, Albemarle St., W. Price 5s.

This small book forms a welcome and useful addition to the series of Imperial Institute Monographs on Mineral Resources, With Special Reference to the British Empire. A general account of the occurrence of oil shales throughout the world is condensed from the literature in a minimum of space. The selection of material is perhaps as judicious as possible, although, like any compilation, the work reflects here and there the inaccuracies of its sources. For example, we learn on page 6 that open-cut mining will probably prevail in the United States.

The first chapter is devoted to a general discussion of the character of oil shale and its utilization. The description of American distillation has, curiously enough, been confined to a published description of a single process, which might better have been omitted or supplemented. The remainder of the book summarizes the most important points of published descriptions of deposits throughout the world. Those interested in oil shales should have no hesitation in adding it to their libraries.

C. L. JONES.

PROGRESS OF APPLIED CHEMISTRY (Annual Report). Issued by the *Society of Chemical Industry*. Vol. 6, 1921. 7s. 6d. to members; 12s. 6d. to non-members, postpaid. Address 46 Finburg Sq., London, E. C. 2.

It is a pleasure to review this admirable and authoritative report on the progress of applied chemistry. It occupies much the same enviable position in industry which the reports of the Chemical Society do in theoretical chemistry. The report is subdivided into a very great many chapters, each chapter having to do with a particular field of chemical industry. Each chapter is compiled by an able critic in the special field and as a rule takes the form of a general review of the industry during the past year, followed by specific details as to progress made, with the names of the men who have made the contributions and the place where the article is published. The criticisms of such progress vary, of course, with the personality of the reviewer. This largely and quite rightly takes the form of a colorless announcement of the contribution. It usually is entirely too soon to pass a final and an adequate judgment on the value of a specific contribution. Occasionally, however, a few adjectives occur in the text which serve as an index of the reviewer's estimate of that particular work. While we must indorse the conservative practice which does not form a premature estimate, yet we do feel that the judgment of a man able to summarize the work done in the particular field is of inestimable value. We would, therefore, urge the reviewers not to lean too far backward in failing to give an estimate of the value of the work done. A reviewer selected by the Society of Chemical Industry may feel considerable confidence that his opinions will be received with respect throughout the industry. This will tend to make him conservative, naturally, but we sincerely hope it will not dull or sheathe the edge of his critical judgment, which is of most value to the readers of such a report.

We have been interested in the inclusion of a section entitled "Bleaching, Dyeing, Printing and Finishing." A chemical industry, to be sure, and one which has received from chemists and chemical engineers in this country all too little consideration. Any system of classification is difficult, and the custom in this country to regard fine chemicals as a much larger and inclusive class than do these reports is a source of some confusion. It would seem more logical to us to include, under a consideration of all organic chemicals, Coloring Materials and Dyes. The development of some organic materials has, I think, been overlooked or, if not overlooked, so placed as not to be easily accessible. For example, hydroquinone and metol have not been located.

With this criticism for omission or misplacement and the expression of the hope that the eminent reviewers will express their opinions of recent advances more freely, we may give vent to a distinct enthusiasm for the whole work and a praise which we hope will not become fulsome.

In general, most of the industries suffered from the widespread depression and the analysis of conditions in the individual industries is in almost every case keen and suggestive. In only one or two cases is there no attempt to make a general analysis of the status of each industry.

In many lines the statement is made that the depression which has existed throughout the industry has militated against research, due to the fact that the personnel has been largely dismissed. (This is also true in this country.) In very few lines is it said that notable advances have been made during the past year. Notable advances mean research, and research means a willingness on the part of manufacturing concerns to invest money in research and men. During the past year this has been practically eliminated. Again, referring to the review of coloring matters and dyes, the fearless statement of the reviewer in regard to the misuse of government subsidy in the dye industry of Great Britain is indicative of the best kind of review work. His criticisms are sound and constructive. It is a great pleasure to compliment the Society of Chemical Industry on continuing this very real contribution to applied chemistry. Technical men would do well to study this book and if only we could bring it to the attention of bankers and inventors who control too many of our chemical industries, we would feel that our mission in life had not been wasted.

CHARLES WADSWORTH, 3D.

ENTROPY AS A TANGIBLE CONCEPTION. By *S. G. Wheeler*, Eng. Lieut.-Commander, R. N. 76 pp., illus. New York: D. Van Nostrand Co., 1922. Price $3.

Many engineers and students of engineering are men of a wholly practical turn of mind, men who are by instinct doers, managers. The prime object of their studies is to acquire the tools which enable them to obtain results, to learn what to do; and not necessarily to learn why it is done.

Most of the methods employed in modern engineering find a basis in abstract mathematics. This is particularly true of thermodynamics, which is a science based on the hypothesis of an imaginary, ideal mathematical cycle which cannot be approached in practice. Such a theoretical basis for a science makes no pronounced appeal to the typical engineer. Consequently the whole subject of thermodynamics is more often than not only half digested by the man who must use it. He understands the way in which any set problem must be solved; but he distrusts the mathematics which must be employed, because he has not a sufficient grasp of the underlying principles to use these mathematics in a free and unhampered way.

Commander Wheeler has written a little book which is well called "an elementary treatise on the physical aspects of heat, entropy and thermal inertia." By a readily comprehensible analogy between the mathematically simple theory of kinetic energy and the obscure theories of thermodynamics, the reader is led by easy stages to a grasp of the physical conception of entropy and of the basis on which a steam chart is drawn.

This book cannot fail to be of value to all those—engineers and others—who are under the necessity of dealing with problems of steam engineering and who have not had the training in mathematics and abstract science necessary to a complete understanding of these problems. It is to be hoped the author will at some time extend his work to include more definitions; and the numerous and valuable charts and diagrams might be presented in a more clean-cut way to advantage. But as the book stands it is a worthy addition to the working library; and the author in writing it has pointed the way to a service which could well be done in other lines where practical men must use mathematics which they do not understand and hence distrust.

G. L. MONTGOMERY.

Technical News of the Week

Current Events in the Chemical, Metallurgical and Allied Industrial Fields—Legislative Developments—Activities of Government Bureaus, Technical Societies and Trade Associations

American Electrochemical Society Moves

Headquarters Established in New York After 20 Years in Bethlehem, Pa.

After having been established at Lehigh University, Bethlehem, Pa., for about 20 years, the American Electrochemical Society has moved its national headquarters to Columbia University, New York City. This action was taken in order to facilitate the work of the secretary, Colin G. Fink, who has recently been appointed lecturer in electrochemistry and who will have charge of that division of the department of chemical engineering at Columbia University. The former headquarters was established in Bethlehem due to the fact that the late Joseph W. Richards, for many years secretary of the Society, was situated there as professor of metallurgy at Lehigh University. The present move has been under consideration for some time and will greatly facilitate the transaction of the Society's business.

In accordance with the recent amendment to the Constitution of the Society, the annual dues are now $8 and by action of the Board the annual charge to members for bound volumes will be $5 per year, effective Jan. 1, 1923. The charge for transactions to non-members will be $6.50 per volume and to public and scientific libraries $4 per volume.

The directors recently authorized the organization of a division of organic electrochemistry and appointed A. W. Burwell temporary chairman with the power to appoint his organizing committee and draw up a constitution and bylaws, to be submitted to the Board for approval at the Montreal meeting.

American Ceramic Society Summer Excursion Plans

"A family excursion: Bring yours!" Such is the slogan that the American Ceramic Society has adopted for its summer excursion meeting which is scheduled for Aug. 13 to 19 and will include visits to Rochester, Montreal, Ottawa, Kingston, Toronto, Hamilton, Niagara Falls and Buffalo. The trip will be made by boat and will be strictly an "outing," affording opportunity for a taste of camp life and the exploration of the Thousand Islands. Among the ceramic points of interest which will be visited are feldspar mills, enamel, glass, tile, brick and porcelain works and the famous Canadian feldspar mines at Verona.

$400,000 for Helium Research

An appropriation of $400,000 for research work and for the production of helium will be available during the fiscal year beginning July 1. The effort of the Senate to reduce this amount to $300,000 was unsuccessful, as the conferees on the War Department Appropriation bill accepted the House figure.

Advisory Committee Lays Plans for Chemical Exposition

Only American Exhibits to Be Admitted. Several Societies to Meet at Exposition

At a dinner meeting held at the Chemists' Club, New York on June 29, the advisory committee of the National Exposition of Chemical Industries considered ways and means to insure the continued success of the exposition at the eighth exhibit to be held in Grand Central Palace during the week of Sept. 11, 1922. One of the most important matters discussed was the type of exhibit that should be permitted. As in previous years, the management has been confronted with the problem of keeping the exposition free from objectionable exhibits and confining it to a strictly national exposition of chemical industries. After considerable discussion and the consideration of a number of special cases, the advisory committee officially decided that only American companies and American products should be admitted to the Exposition except on special approval of the committee. This general principle was adopted for the guidance of the management which will subsequently bring before the committee any cases that are not satisfactorily covered by the resolution.

The programs that are being arranged comprise special meetings of the American Ceramic Society, the Technical Association of the Pulp and Paper Industry and the newly organized Technical Photographic and Microscopical Society. In addition to these the committee planned to obtain addresses by popular leaders who have a full appreciation of the importance of developing our chemical industries and who will bring a message that will impress this fact upon the general public.

The management reported to the advisory committee the results of a meeting held with the recently organized Chemical Equipment Association at which a number of moot points were settled to the satisfaction of the exhibitors. At a subsequent interview between the management and the chairman of a special exposition committee appointed by the Chemical Equipment Association some further matters of interest to exhibitors were discussed, and it is felt that as a result of these conferences the atmosphere has been thoroughly cleared and all questions relating to policy of the management have been satisfactorily answered.

Those in attendance at the meeting of the advisory committee were: CHARLES H. HERTY, chairman, president of the Synthetic Organic Chemical Manufacturers Association; M. C. WHITAKER, vice-president and general manager of the U. S. Industrial Alcohol Co.; P. C. KINGSBURY, the General Ceramics Co.; L. H. BAEKELAND, president, the Bakelite Corporation; T. B. WAGNER, consulting chemical engineer; R. P. PERRY, the Barrett Co.; BERNHARD C. HESSE, General Chemical Co.; JOHN E. TEEPLE, president of the Chemists' Club; DAVID WESSON, past-president of the American Institute of Chemical Engineers; HENRY B. FABER, National Aniline and Chemical Co.; CHARLES F. ROTH and F. W. PAYNE, co-managers of the Chemical Exposition and H. C. PARMELEE, Editor of *Chem. & Met.*

Steel Alloy Plant for Canada

The Dominion Alloy Steel Corporation, Ltd., has been organized with an authorized capitalization of $7,500,000 8 per cent cumulative preferred stock, $7,500,000 of common stock and $2,500,000 of bonds, of which $5,000,000 of preferred and $4,400,000 of common stock have been issued. The company has purchased a site on the River Ste. Claire, at Sarnit, Ont., and will erect a plant, consisting of open-hearth and electric furnaces, rolling mills, machine shops and laboratories, for the manufacture of special alloys and high-carbon steels. The plant will be a duplicate of the United Alloy Steel Corporation's plant at Canton, Ohio, some of the directors and stockholders being interested in both concerns, and will have a capacity of 100,000 tons of steel yearly. The production of the plant will be made mainly with a view to supplying the automobile manufacturers of Canada.

Harry Ross Jones, director and formerly president of United Alloy Steel Corporation, is chairman of the board of directors; William E. Boyd, Toronto, president; George Simpson, formerly sales manager of the Steel Company of Canada, vice-president; and Bert H. McCreath, second vice-president.

Government Appropriation for Muscle Shoals Carries Provision for Delay of Work

Appropriation for Construction of Wilson Dam Passed by Both Houses but Will Not Become Available Until October 1 on Account of Pending Action on Ford Offer

BY A VOTE of 145 to 105 the House of Representatives, on June 24, agreed to concur in the Senate amendment to the War Department appropriation bill which appropriates $7,500,000 for the reopening of construction work on the Wilson Dam at Muscle Shoals. The vote carried with it, however, approval of an amendment by Representative James, of Michigan, which provides that no portion of the $7,500,000 is to become available before October 1. The purpose of the amendment was to give additional time for Congress to pass definitely on the Ford offer. The amendment was actively supported by those favoring the Ford offer who saw in the Senate amendment an effort to delay definitely any action on the Ford proposition. The House voted down, however, another amendment proposing a delay until January 1 before use could be made of the appropriation provided by the Senate amendment.

While the Senate was practically unanimous in its disapproval of the action of the House in delaying the time at which the $7,500,000 appropriation for the reopening of construction work on the Wilson dam at Muscle Shoals, nevertheless the Senate voted to concur in the House amendment. Senator Norris, the chairman of the Committee on Agriculture, which has jurisdiction over the Muscle Shoals proposition in the Senate, submitted a motion to disagree with the House amendment and urged that the bill be sent back to conference and so altered that the appropriation would become available immediately, as had been provided by the Senate. This motion was lost, however, by a vote of 28 to 32.

Delay Caused by Ford Offer

Friends of the Ford offer in the House not only declared that the Senate amendment was conceived with the idea of killing the Ford offer, but stigmatized it as a piece of hypocrisy—the drawing of a herring across the trail, in an effort to deceive the people.

Senator Underwood and other advocates of the Ford offer, declared that they are entirely at a loss to understand the logic which prompted the House to accept, by a majority of 40 votes, the amendment by Representative James, of Michigan, which postpones until October 1 the availability of the $7,500,000 appropriation.

Senator Norris pointed out that the amendment originated in an entirely regular way in the Committee on Agriculture and had the unanimous support of each member of that committee. It was brought on the floor, explained to and adopted by the Senate without any attempt at concealment or any resort to sharp practice. He declared that he is at a loss to understand why his committee and the Senate is accused of hypocrisy in the matter. Senator Underwood, who is admitted to be the most powerful friend of the Ford offer, concurred with that expression by Senator Norris and declared the amendment could not be construed as being anti-Ford.

Delay Will Seriously Handicap Construction Work

Senator Norris, in his remarks, pointed out that a delay of three months in making the money available means the loss of a year's time on a portion of the work. He referred to foundation construction, which can be conducted only during July, August and September, when the stage of the river is low. Senator Norris estimated that fully $2,000,000 less work will be done with the appropriation by beginning the work October 1 than would have been the case had it started July 1.

Senator Underwood explained that he would vote to concur in the House amendment because he feared that the appropriation might be lost altogether were the bill sent back to conference. "The gentleman," he said, "who expressed the opinion as to the hypocrisy of the Senate, evidently thought it would be hypocrisy to build this dam in July but not hypocrisy to propose to build it in October."

Some days before the vote on the conference report, Senator Norris had pledged himself to do all in his power to bring the Ford offer to a final vote at the earliest possible moment. He took the ground, however, after the action of the House, that he now is released from that promise. As chairman of the committee having jurisdiction in the matter he is in a position to delay the consideration of the Ford offer in the Senate.

Senator Lodge made the following contribution to the discussion: "The amendment of the House is economically wrong. It is not right or fair to the tax-payers. It ought not to be accepted by the Senate. The amendment by the House is indefensible."

Muscle Shoals as a Political Issue

From a political standpoint, the House amendment is regarded as a victory by the Democrats. While they admit that the Senate may not vote on the Ford offer before October 1, this delay does embarrass the Republican leaders in the House since they must either put the Ford proposition to a vote or be accused of an attempt to kill the Ford offer by refusing to allow it to come to a vote. Each party recognizes the political possibilities of the situation. Largely through the very active efforts of the Farm Bureau Federation, large support for the Ford offer has been developed among the farmers of the Middle-west and Northwest, sections where fertilizer is beginning to play an important part in agriculture. In addition Mr. Ford has a large personal following, which the Republican leaders do not want to antagonize, especially just before an election. As a result of this latest maneuver Muscle Shoals is expected to remain on the tapis for several months.

Safety Code for Conveyors and Conveying Machinery

American Engineering Standards Committee Announces Preparation of Safety Specifications

An important step toward the solution of an accident problem has just been accomplished through the decision of the American Engineering Standards Committee that the development of a safety code for conveyors and conveying machinery be undertaken.

The introduction of mechanical conveyors in many industries has eliminated a large proportion of the accidents resulting from the manual handling of materials. At the same time, it has introduced new hazards, many of which can be prevented by a more general agreement among both users and manufacturers of conveying equipment as to safe practice in the manufacture, installation and operation of such equipment.

The American Society of Mechanical Engineers and the National Bureau of Casualty and Surety Underwriters have been appointed joint sponsors for this code. All interested national organizations will be asked to co-operate in the formulation of the code. This code will be intended as a guide for the safe operation and maintenance of conveyors and conveying machinery coming under the following main divisions: gravity, belt, chain, flight-bucket, apron, screw and jigging conveyors, car hauls, aerial cableways, overhead trolley, and pneumatic tubes.

All shafting, pulleys, belts, link belts, chains, gears, sprockets, couplings, clutches, etc., used on and in connection with conveyors and conveying machinery will be covered in the mechanical power transmission code now in preparation.

Chemical Warfare Appropriation Will Go for Research

Plans for the allotment of the $600,000 appropriated for the use of the Chemical Warfare Service during the fiscal year beginning July 1 have not been perfected as yet due to the illness of Brigadier-General Amos A. Fries, the head of the service. It is known, however, that most of the money will be expended on research work and on defensive training of troops.

Society for Improvement of Engineering Education Attempts Move for Broader Training

At the annual convention of the Society for the Promotion of Engineering Education which was held recently at the University of Illinois, Charles F. Scott, of Yale University, outlined a new and broader vision of engineering education based on the needs and demands of industry. In tracing the parallel development of university education and the economic trend of industry in this country he pointed out that all basic industries are looking not only for trained technicians but leaders of production and in administration, leaders who have a through understanding of the relationship of engineering to the economic development of this country's resources and business requirements of the future. The building up of efficient teaching staffs, he declared, is one of the prime functions of the society for the promotion of engineering education if that organization is to lead the requirements of industry and develop men who are prepared to deal with the new and changing problems of engineering. The council of the society adopted the following resolutions for the broadening of its actions:

> Resolved, That the president of this society appoint a committee of 5 members, including himself, to study the development of the society for the promotion of engineering education and to formulate an answer to the question, "What can the society do in a comprehensive way to develop, broaden and enrich engineering education?" and further that this committee shall report, as early as feasible, formulations of the answer back to the council for action on the committee's recommendations.

At the last session of the Council of the S. P. E. E., the plan of the midwest deans for a five-year course was presented but not endorsed. The midwest deans agreed among themselves to go ahead as a separate unit and develop the plan as originally laid down at the meeting in Chicago on May 10.

New Section Established

The Council at the same meeting decided to establish a new section within the society composed of deans and directors of engineering schools. This is the culmination of a discussion on this subject which started at the New Haven meeting last year. The new section of deans of the society will deal with general administrative matters. This new section does not incorporate the organization of midwest deans which is a separate organization without connection with the Society, that is working out the five year course for engineers.

The keynote of the discussions was the development of teachers who can train engineers along the lines of the plans that are now being studied to to make university training more effective. The plan of instruction for freshmen now being followed at Purdue University as inaugurated and explained by Dean A. A. Potter created much discussion. This plan aims to stimulate the interest of the student early in his course by introducing engineering problems that appeal to his instincts and deal with actual situations calling for solutions designed to train him to think clearly, act quickly and calculate accurately. It is also a rough measure of his fitness to pursue engineering work. The instruction includes general lectures, inspection trips and simple engineering problems. The discussion brought out the fact that similar work is being conducted in several other colleges and much interest in the results of the plan after another year or so of its application was expressed.

Officers Elected

The following officers were elected for the coming year: President, Charles F. Scott; vice-presidents, D. S. Kimball, of Cornell University, and F. G. Higbie, of Iowa State University. New members appointed to the council are: M. W. Alexander, National Industrial Conference Board; Edward Bennett, Wisconsin University; H. S. Evans, University of Colorado; E. A. Hitchcock, Ohio State University; H. J. Hughes, Harvard University; C. E. Magnusson, University of Washington; G. C. Shaad, University of Kansas.

Safety Congress to Meet in Detroit

Prospects for Very Successful Meet—Program for Chemical Division

The program of the eleventh annual safety congress of the National Safety Council at Detroit Aug. 28 to Sept. 1 is now complete. Indications are that the 1922 convention will be the largest and most complete in the history of the National Safety Council. Public officials, industrial executives, well known authorities in research, science and education have volunteered to appear on the programs to do their bit for national safety.

Complete discussion of the various phases of industrial and public safety will be had at the meetings of the twenty different sections into which the Council's activities are divided. These meetings will cover safety problems in the automotive, cement, chemical, construction, metals, paper and pulp, packers and tanners, rubber, textile, woodworking, electric railway, public utilities, steam railroads, mining, public safety, educational, engineering, drop forge, health service and women in industry divisions.

All meetings will be held in the new Cass Technical High School which has just been completed as one of the finest educational institutions of its kind in the country. The main auditorium will accomodate more than 3,000 persons. Other commodious facilities for sectional and committee meetings are included in the same building. Practically all available space is taken for the safety exhibit which will be held in a large hall immediately adjoining the main auditorium. The dust explosion exhibit of the U. S. Department of Agriculture has been secured as a feature. Special outside exhibits including a Ford Motor Company exhibit, a model safety street car exhibit and a night parade to demonstrate safety headlights for automobiles are planned.

Program of Chemical Section

The chemical section is under the chairmanship of S. H. Kershaw, of the Hercules Powder Co. and E. J. Reiderer, of the Atlas Powder Co. G. E. Minshull of the E. I. du Pont de Nemours and Co. is secretary.

The first session will be held Aug. 29 at 9:30 a.m. After the business meeting, committee reports, etc., Walter G. Whitman, professor of chemical engineering at Massachusetts Institute of Technology will give an address on "Safe Handling of Materials in Chemical Plants." F. J. Hoxie, engineer and special inspector for the Associated Factory Mutual Fire Insurance Companies.

The second session of this division on Aug. 30 will be featured by the report of the industrial poisons committee of which A. L. Watson, of the Hooker Electrochemical Co., is chairman. A paper on "Benzol Poisoning, Its Occurences and Prevention," will be presented by Charles F. Horan, of the Hood Rubber Co.

Journal of Scientific Instruments

The British Institute of Physics, 10 Essex St., London, has issued a specimen number of a proposed monthly *Journal of Scientific Instruments*, to be devoted to methods of measurement and the construction and use of instruments.

Heavy Chemical Freight Rates Protested

In a complaint to the Interstate Commerce Commission, the Mathieson Alkali Works of New York alleges unreasonable rates on chlorine gas from Niagara Falls to points on the Baltimore and Ohio railroad, because of the failure of the railroad to allow mileage on the tank cars of the alkali company either for the outbound or the return movement. The commission is asked to establish reasonable rates and regulations governing the use of the alkali company's tank cars in liquefied chlorine gas traffic.

In the complaint of the Hercules Powder Co., an Interstate Commerce Commission examiner recommends that the rates on sulphuric acid from Danville, Ill., to Ishpeming, Mich., are unreasonable.

Alien Property Disposal Would Be Investigated Under Bill Now Before House

Chemical Foundation Included in Scope of Bill Calling for Explanation of Activities of Former Alien Property Custodian

A BILL embodying the principles recently announced by the President with regard to the disposition of alien property has been introduced in the House of Representatives. An understanding as to the matters covered by this legislation was reached at a recent conference between the President, the Secretary of State, the Attorney General and the Alien Property Custodian.

In urging the adoption of the bill in the House, Representative Woodruff, of Michigan, declared that the Chemical Foundation and Bosch Magneto cases are instances of flagrant maladministration of trust property, calling for swift and drastic action. He referred to George J. Corbett as chief aid of former Custodian Garvan in putting over the "Chemical Foundation deal," the former becoming secretary of the concern on its organization and receiving substantial compensation out of trust properties for services rendered the custodian. He also said the matter of L. Vogelstein Co. in relation to the metal situation should be investigated.

MILLER INTERPRETS SCOPE OF BILL

Discussing the proposed bill, Colonel Thomas W. Miller, the Alien Property Custodian, said: "One section provides for the return to the former owners of all property out of every trust not exceeding in value in any case the sum of $10,000. This means that smaller property owners whose property is valued at $10,000 and under will receive their property back in full at this time. Of the thirty-two thousand active trusts now administered by the Alien Property Custodian about 93 per cent are of the value of $10,000 and under. In addition, the property in every trust in excess of $10,000 will receive that sum from the Custodian on account.

"Another section provides for the extension of time in the filing of suits allowed under the various sections in the 'Trading with the Enemy Act,' made necessary by the expiration of said period under the present act.

"The third section refers to assignments and limits attorneys' fees.

"Section four provides means by which the President may, at his discretion, transfer funds on deposit in the Treasury so that the Alien Property Custodian may deposit the same in banks, said deposits being insured by Liberty Bonds as collateral, with a view to utilization in the economic relations between this country and Europe pending the time such funds are held for final disposition by this government.

"The last section will clear up claims of naturalized American citizens who have been under a presumption of expatriation by reason of their absence from the United States before the war and whose property was seized as a result of their being in Germany or an enemy country during the state of war.

"This bill embodies the recommendations made by the Alien Property Custodian's office to President Harding and represents the initial step of this administration in the final disposition of of the alien property situation. A claims tribunal will undoubtedly be created by the treaty under negotiation between the Department of State and the German Government which will adjudicate and settle the question of American claims against Germany and their relation to the alien property still to be held."

Chemical Foundation Suits Explained by Choate

In regard to widely published statements concerning certain law suits which have been instituted by the Chemical Foundation against several manufacturers, Joseph H. Choate, Jr., counsel for the Chemical Foundation has authorized the following statement:

> Statements which have recently appeared in the press in regard to the commencement of certain suits by the Chemical Foundation against a number of manufacturers have apparently produced a false impression. Some of these intimated that the companies thus sued were charged with improper, if not unlawful, acts. Nothing could be further from the truth. The suits are entirely friendly actions, brought to establish the title of the Foundation to the funds long since paid by the defendants as royalties for the use of patents now owned by the Foundation, under licenses issued by the Federal Trade Commission. The trading with the enemy act provided that these funds be held in the U. S. Treasury as a trust fund for the owner of the patents and for the licensees, as their respective rights might be determined by suits to be brought by the owner against the licensees. This provision compelled the Foundation, which would have no difficulty in agreeing with almost all of the licensees, to bring such suits as the only means of securing from the Treasury moneys to which it is entitled. The companies sued have, generally speaking, done everything that they should in the matter and nothing that they should not.

Marconi to Receive Medal

The John Fritz medal will be presented to Senator Guglielmo Marconi in the auditorium of the Engineering Societies' Building, 29 West 39th Street, New York, Thursday evening, July 6.

Federal Phosphorus Co. Denies Removal Report

Theodore Swann, president of the Federal Phosphorus Co., Birmingham, Ala., has issued a statement denying recently published reports to the effect that his company contemplated the removal of its Anniston plant to Jacksonville, Fla. The conference between the City Commission of Jacksonville and T. L. Long, who was reported to be the representative of the Federal Phosphorus Co., was entirely unauthorized and without the knowledge of Mr. Swann. There is no intention of moving the plant.

Metallographic Institute Organized in Sweden

Result of Co-operation of Government, Educators and Manufacturers

A Metallographic Institute was formally inaugurated in Stockholm, Sweden, on June 1. The exercises were presided over by Professor Svante Arrhenius and were attended by representatives of Stockholm University, the Ironmasters' Corporation (Jernkontoret), the Engineering Academy and the national government. Preliminary steps in the organization were instituted by Stockholm University and the new Institute has been financed by contributions from the leading manufacturers of Sweden, in co-operation with Jernkontoret. The Government has placed suitable quarters at the disposal of the Institute.

Carl Benedicks, the well known physicist and authority on physical metallurgy has been appointed head of the Institute. The object as embodied in the declaration of its founders is "To practice and further scientific resarch in metallography and allied subjects." In his inaugural speech, Dr. Benedicks announced that one of the actual aims of the Institute, and one upon which they have already embarked, is research work designed to determine the space lattices of atoms in pure metals and alloys. Besides such purely scientific research work, the Institute will answer questions, furnish advice and report upon specific metallographic problems of a more practical nature.

The Institute is thoroughly equipped with instruments and appliances of the most modern type. It has a special room containing several electric melting furnaces, including a Northrup high-frequency furnace, considerably improved by new appliances added by the staff of the Institute. It is also very well equiped with measuring and recording apparatus, including a double string galvanometer and a powerful du Bois electromagnet. The laboratories for microscopic photography and chemistry are very well equipped. In addition to this, the Institute has its own machine shop, possessing sufficient precise tools for the manufacture of new instruments and appliances which will be required from time to time as the work proceeds.

Chemical Warfare Gas Used as Fumigant

Cyanogen Chloride May Supplant Hydrocyanic Acid as Result of C. W. S. Research

Cyanogen chloride is expected to supplant hydrocyanide acid gas for ship fumigation as a result of co-operative research and experimentation on the part of the Chemical Warfare Service and the Public Health Service. In the course of this work it was developed a few months ago that the greatest objection to hydrocyanic acid gas could be overcome by mixing it with ordinary military tear gas. This ingredient made it possible to recognize the presence of the gas in the holds of vessels. As the work progressed, however, it was found that cyanogen chloride gas serves all the purposes accomplished by hydrocyanic acid gas and has the advantage of being readily recognizable.

This work along with the progress which has been made in the use of toxic materials in anti-fouling paints is pointed to at the Chemical Warfare Service as typical of what is being done by the Service in its co-operative research with other Government bureaus. The work on anti-fouling paints has been done in co-operation with the Navy's marine biological laboratory at Beaufort, S. C. Every effort is being made by the Chemical Warfare Service to make available to all concerned the results of the intensive work done by scores of chemists during the war on toxic materials.

Congress Will Not Incorporate Scientific Societies

The subject of incorporation of scientific societies was brought up in the House of Representatives by the introduction of a bill proposing the incorporation of the American Mathematical Society. Objections by Representatives Stafford of Wisconsin and Huddleston of Alabama prevented the passage of the bill. The former expressed the conviction that if Congress intended to incorporate every scientific society it should do so by a general law and not in special bills for each society and referred to the possibility that the American Automotive Society and the American Chemical Society might desire incorporation. Representative Huddleston opposed incorporation of societies by Congress on general principles.

Treasury Department Ruling on White Lead

The Treasury Department has ruled that the allowance for valueless waste incurred in the Carter process of manufacturing white lead shall not exceed 1 per cent of the quantity of lead used. The ruling was issued in connection with the payment of the drawback on white lead made from imported lead.

Civil Service Openings

The United States Civil Service Commission announces open competitive examinations for junior microanalyst in the Bureau of Chemistry at a salary of $1,400 to $1,800 and for junior aids in the Bureau of Standards at salaries of $540 to $840 per year. Junior assistants are afforded the opportunity of continuing their college work at local universities. Application should be made on form 1312.

Personal

F. W. BARKER, JR., who has been in the chemical division of the manufacturing department of the National Aniline and Chemical Co., Inc., has severed his connection with that company and is now associated with The Kaumagraph Co.

H. C. CUMMINS has been elected president of the Shaffer Oil and Refining Co., Chicago, Ill., to succeed GEORGE N. MOORE, resigned. Mr. Cummins was formerly vice-president and secretary, and has been succeeded as vice-president by W. H. CANNADY, heretofore manager of the refining department; and as secretary by W. R. FRANCISCO, who will also act as treasurer.

E. L. DOHENY has been elected chairman of the board of the Mexican Petroleum Co., of New York, N. Y., and its subsidiary organizations. HERBERT G. WYLIE, formerly vice-president and general manager, has been elected president to succeed Mr. Doheny.

C. R. DOWNS, formerly chief chemist of the research laboratory of The Barrett Co., Edgewood, N. J., is now with the National Aniline and Chemical Co., Buffalo, N. Y.

F. B. FOLEY has been relieved as a member of the drill steel field-survey committee and has returned to his station at the Bureau of Mines in Minneapolis, where he will resume his experimental work on this subject. C. Y. CLAYTON and H. S. BURNHOLZ are continuing this joint field study of the Bureau of Standards and Bureau of Mines, visiting the various mines which are co-operating in the drill steel study.

ERNEST A. HERSAM, of the University of California, has been appointed by the Bureau of Mines as a metallurgist to work on the survey of milling methods which is being done in co-operation with the American Institute of Mining and Metallurgical Engineers. Prof. Hersam's headquarters will be at the Massachusetts Institute of Technology where he will be associated with Prof. Locke. The work will include an extended survey under the general chairmanship of G. H. CLEVENGER of the Committee on Milling Methods of the Institute. This work also involves co-operation with the pulverizing committee of the Engineering Division of the National Research Council.

Senator GUGLIELMO MARCONI will receive the John Fritz medal July 6, 1922, in the auditorium of the Engineering Societies Building, New York.

I. E. NEIFERT, a chemist formerly with the Chemical Warfare Service, who now is a member of the faculty at Knox College, Galesburg, Ill., has been engaged by the Department of Agriculture to do research work during the Summer on grain fumigation. The Department is very anxious to develop a fumigating agent which does not carry with it a fire or poison hazard. Particular attention is to be given to the effects on grain of the use of chlorpicrin.

Dr. R. F. RUTTAN, the retiring president of the Society of Chemical Industry, and Dr. A. T. CHARION will represent Canada and the Canadian Institute of Chemistry at the Third annual meeting of the International Union of Pure and Applied Chemistry.

JAMES A. STADER has been appointed chief of the minerals section, Iron and Steel Division of the Bureau of Foreign and Domestic Commerce. He began work in the new position on July 1, giving special attention to the nonferrous metals and non-metallic mineral products, for which there has been no commodity division of the Bureau formerly. Mr. Stader is a graduate of the University of Missouri, and has had extensive experience in the Far East, Mexico and Europe. He was for some time a technical advisor of the Inter-Allied Industrial Commission dealing with problems of reparations of coal, oil and mineral products. He leaves a temporary connection with the Seiberling Rubber Co. to accept this Government appointment.

Prof. E. W. WASHBURN, head of the department of ceramic engineering, University of Illinois, will succeed Dr. FREDERICK G. COTTRELL as chairman of the division of chemistry and chemical technology of the National Research Council.

Obituary

ALEXANDER R. SMOLEY, and not Alexander R. Smalley, is the name that should have appeared in the obituary notice in our issue for June 21. His age was 27 and not 25 as given.

FRANK L. STILES, president of a number of New England brick manufacturing companies, died at his residence in North Haven, Conn., June 9, in his 69th year. At the time of his death he was president and treasurer of the I. L. Stiles & Son Brick Co., North Haven; and also president of the following companies: North Haven Brick Co., North Haven; Stiles & Reynolds Brick Co., Berlin, Conn.; Stiles and Hart Brick Co., Taunton, Stiles & Hart Brick Co., Taunton, Bridgewater, Mass. He enjoyed a national reputation in the industry, and was at one time a member of the Connecticut State Legislature.

Market Conditions

IN CHEMICAL, METALLURGICAL AND ALLIED INDUSTRIES

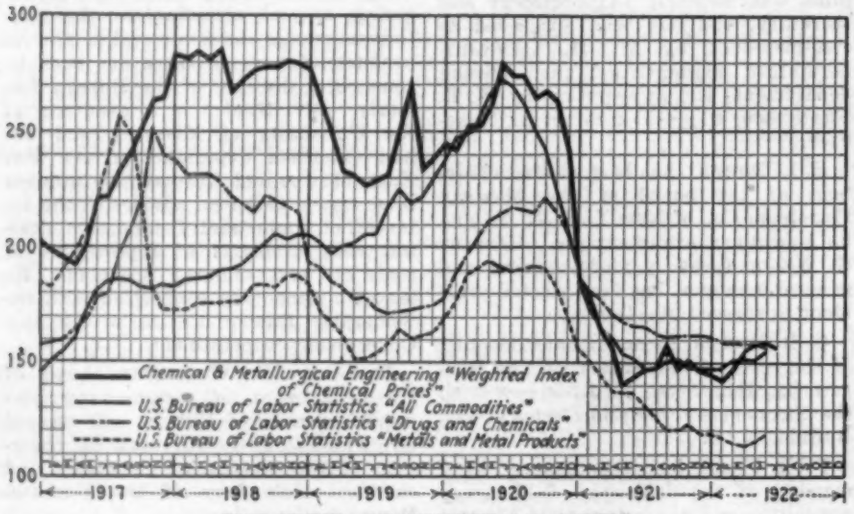
A Survey of the Economic and Commercial Factors That Influence Trade in Chemicals and Related Commodities—Prevailing Prices and Market Letters From Principal Industrial Centers

Business Conditions Steadily Improving

A Review of Fundamental Economic Conditions Shows That the Gains in the General Business Situation Are Becoming More Evident in the Chemical and Allied Industries

TO SURVEY the progress of business during the first six months of 1922 is to gain a new confidence in the thoroughness of its remarkable recovery. Each month since January has shown a gradual, consistent betterment in underlying business conditions and this has been accurately reflected in practically every line of industry. Improvement is still the predominating note in the business situation, notwithstanding that the gains made during June were somewhat less pronounced—due perhaps to the fact that certain industries have reacted to the common tendency for a seasonal lull in activities. For the most part, however, the basic lines of manufacture represented by the chemically controlled industries have continued to show the stimulating effects of business revival and the return of confidence in industry.

Factors favoring this improvement, or resulting directly from it, are the increased production in certain basic industries, the unusual building activity, the stable if not increasing prices, the growing commodity consumption as measured by car loadings, and the decrease in unemployment and in business failures. The trump cards in the hands of the business pessimist, on the other hand, are the continued labor difficulties in the coal fields and textile centers, the threatening railroad tie-up and the apparent reaction taking place in the stock market. Fortunately, there is growing evidence, however, that these cards may never be played. The administration's efforts toward reaching an early settlement of the coal strike and the widely held belief that the present decline in the market is only a temporary set-back are factors from which significant developments may yet be expected.



THE TREND OF WHOLESALE PRICES, 1917-1922

"CHEM. & MET." WEIGHTED INDEX OF CHEMICAL PRICES

Base = 100 for the year July 1, 1913, to June 30, 1914

This week	157.32
Last week	156.89
July, 1921	148
July, 1920	274
April, 1918 (high)	286
April, 1921 (low)	140

This week's index number shows a net gain of .63. Slightly lower prices for soda ash and caustic soda were more than compensated by advances in ammonium sulphate, barium chloride, copper sulphate, glycerine and linseed oil.

The Industrial Situation

Before considering any of these factors in greater detail, however, it is worth while to give attention to how the situation is being reflected in the different industries.

Iron and Steel. May, with a total production of pig iron amounting to 2,306,679 tons, represents a gain of 11.3 per cent over April and of 16 per cent over the first five months of 1921. Steel ingot production of 3,099,155 tons is 114 per cent of the output of May, 1921 and the largest since October, 1920. Furthermore, steel production in 1922 is 33½ per cent greater than during the corresponding period of last year.

Automobile. The National Automobile Chamber of Commerce estimates the May production of cars and trucks at 252,167, an increase of 15 per cent over April and 54 per cent above May, 1921. This is the largest previous month since March, 1920. At present only 14 per cent less people are employed in the Detroit industries than at the time of the 1920 peak.

Petroleum. While crude oil production has been continuing at a low rate, it is interesting to know that the output of gasoline in April, the latest month for which statistics are available, amounted to 472,920,000 gal. This is another new high record and compares with a consumption of 385,564,000 gal.

Construction. All previous construction records had been broken in April but apparently May's building contracts exceeded those of April by over 3 per cent. According to the F. W. Dodge Co., the May total for 27 northeastern states was $362,590,000 which was 50 per cent greater than in May of last year.

Leather. The leather industry as a whole is encouraged by the broader demand for its products. The recent price adjustments have done much to stimulate the tanning industry which has been suffering from the very narrow margin between hide costs and leather prices.

Paper. The total newsprint produced in May, 1922 was 129,950 net tons—an increase of 65 per cent over the 78,868 tons produced in May, 1921. The output during the first five months of 1922 totals 562,912 tons as compared with 528,678 tons during the corresponding period of last year.

Rubber. This industry has of course benefited by the activity in the automobile industry. Reports are to the effect that the Akron plants are running at maximum capacity based on present working forces. It is expected that production will continue at an even keel during July and any seasonal slackening will scarcely have effect before August.

Drugs and Chemicals. Valuable as an index of business sentiment are the results of a questionnaire on business revival sent to a trade group within this industry by the National Institute of Credit. The question: Has the revival of business activity reached your industry? was answered affirmatively by 86 per cent of the group.

Paint and varnish. One hundred per cent of the paint and varnish group testified to the effects of business revival, 78 per cent reported greater sales for May, 1922, than in May, 1921, and all but 4 per cent declared that May sales had exceeded those of April.

Cement. This industry is having difficulty in supplying the demand caused by the large volume of construction now under way. May figures, recently released by the Geological Survey, show an increase in production of 1,895,000 bbl. over that for May, 1921.

Wholesale Prices

Commodity prices since the first of the year have shown marked advances and it is only recently that the tendency to remain stationary has become evident. Bradstreet's monthly index during the past year has advanced ten times and decreased only twice and then to a minor extent. Wholesale prices according to this index are now 12.1 per cent above last year's.

The U. S. Bureau of Labor Statistics has recently revised its index numbers on the basis of a regrouping of commodities and the use of 1919 census data for weighting purposes. Unfortunately, this revision was not announced in time to make the necessary changes in the accompanying chart, which is continued on the old basis. The new index for all commodities is 143 for April and 148 in May, which is a most significant advance.

Chem. & Met.'s weighted index of chemical prices recorded a slightly lower level for June. This index had averaged 158.04 for April, 159.32 for May and declined to 157.48 for the month of June.

Other Significant Developments

Car loadings, which under certain circumstances may be considered a reliable index of distribution and therefore of consumption, have increased steadily. Loadings for the week ended June 17 amounted to 860,722 cars, the largest number of cars loaded in any one week since October 22, 1921. This compares with 750,645 in the week of June 3 and 846,002 in the week ended June 10. The largest increase was in merchandise, less than carlots of miscellaneous freight and ore loadings.

The financial situation has been featured by wide fluctuations in the markets for industrial stocks and foreign exchanges. The almost steady advance of the stock market which started last August experienced its first substantial set-back during June. However there is abundant evidence that this is a temporary reaction brought on by the wild speculation characterizing dealings in many issues. In the case of some of the chemical companies the reaction has caused almost disastrous depreciation. On the other hand certain oil stocks, notably those of Mexican Petroleum and allied companies, reached new levels during the speculative rise and have since maintained substantial gains.

Chemical Market During Second Quarter of 1912

THE COMMODITY MARKETS for chemical and allied products were without significant developments during the three months ended July 1, 1922. With the exception of a few of the more important basic materials, the improvement has been only moderate. Noticeable price fluctuations have for the most part been limited to items of a speculative nature. Minor changes have had a tendency to keep the market active, however, particularly to small-lot buyers.

Market Features

Among the important features of the market has been the significant recovery of barium products. Barium chloride had been quoted at $52 per ton in January, but steadily increased in price until it had reached a new high record of $105 in May. Competition, especially from increased imports, has tended to lower prices during June and at the end of the month dealers were quoting $95 per ton. The prussiates have also attracted a great deal of attention because of their wide fluctuations. Yellow prussiate of soda opened the year at 16c. per lb. During February and March it advanced to 18½c. but declined in April to 16½c. per lb. The advance was renewed in May, however, and a new high level was established at 25c. per lb. June prices have averaged about 22c. Yellow prussiate of potash has shown a similar improvement, advancing from 25c. per lb. in January to 32c. toward the end of June. Red prussiate has been exceedingly scarce and prices as high as 90c. per lb. have been reported.

Caustic soda has been something of a disappointment to the producers, who claim that prices are not in line with the unusual heavy domestic and export demands. Prices, however, have shown considerable improvement. They opened the year at $3.25 per 100 lb. and steadily advanced to $3.70 in April and then to $3.90 per 100 lb. in May. June prices were reported around $3.80 per 100 lb. Manufacturers of oxalic acid increased prices from 11½c. per lb. in April to 14c. per lb. in June. Improved demand and higher costs have been directly responsible for the increase. Copper sulphate showed a net advance of ½c. per lb. during the interval.

Copperas, potassium bromide, acetate of soda, fluoride of soda, barium carbonate, salt cake and tartaric acid are other of the more important items to show increased prices during the second quarter. On the other hand, a number of declines were recorded. Perhaps the most important is in the case of sulphuric acid, the market for which is at present below pre-war levels. The decline since April has amounted to about $2 per ton and 66 deg. acid in tank cars, is now quoted at $15 per ton. Granular zinc chloride, nickel salts, formaldehyde, acetate of lead, acetic acid, methanol, glycerine, potassium bichromate and ammonium sulphate have also recorded fractional declines.

A monthly comparison of the average prices of 45 important chemicals in the New York market during the past six months is to be found in the accompanying table.

A SIX-MONTHS REVIEW OF THE PRICES OF 45 IMPORTANT CHEMICALS, JANUARY-JULY, 1922

Article	Unit	Average Price for Month of— Jan.	Feb.	March	April	May	June	Price on July 1
Acetic acid, glacial	Lb.	$0.10	$0.09	$0.09	$0.09	$0.09	$0.08½	$0.08½
Muriatic acid, 20 deg.	100 lb.	1.25	1.15	1.15	1.10	1.10	1.10	1.10
Nitric acid, 40 deg.	Lb.	.06½	.06½	.06½	.06	.06	.06	.06
Oxalic acid	Lb.	.14	.14	.14	.11½	.13½	.14	.14½
Sulphuric acid, 66 deg.	Ton	16.50	16.00	16.00	17.00	15.50	15.00	15.00
Acetate of lead	Lb.	.10½	.10½	.09½	.09½	.09½	.09½	.09½
Ammonia alum, lump	Lb.	.03½	.03½	.03½	.03½	.03½	.03½	.03½
Aluminum sulphate, iron free	Lb.	.02½	.02½	.02½	.02½	.02½	.02½	.02½
Sal ammoniac, white gran.	Lb.	.06½	.06½	.07	.07	.07	.06½	.06½
Ammonium sulphate	100 lb.	2.35	2.50	3.25	3.75	3.60	3.30	3.30
Amyl acetate	Gal.	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Arsenic, white powder	Lb.	.07	.07½	.07½	.07	.07	.07½	.07½
Barium chloride	Ton	50.00	56.00	75.00	95.00	105.00	93.00	95.00
Bleaching powder	100 lb.	2.25	2.10	1.75	1.60	1.60	1.60	1.60
Calcium acetate	100 lb.	1.75	1.75	1.75	1.75	1.75	1.75	1.75
Camphor	Lb.	.90	.92	.90	.82	.79	.79	.80
Copperas	Ton	15.00	15.00	15.00	15.00	20.00	20.00	20.00
Copper sulphate, crystals	100 lb.	5.65	5.60	5.55	5.50	5.75	6.00	6.50
Epsom salts, U.S.P.	100 lb.	2.65	2.65	2.60	2.50	2.50	2.50	2.00
Formaldehyde, 40%	Lb.	.10½	.10	.08½	.08½	.08½	.08½	.08½
Fusel oil, refined	Gal.	2.50	2.50	2.50	2.15	2.15	2.25	2.25
Glaubers salt	100 lb.	1.25	1.15	1.00	.85	.90	.95	.90
Glycerine, c.p.	Lb.	.16½	.16½	.16	.13½	.15	.14½	.14½
Methanol, 95%	Gal.	.61	.59	.58	.57	.57	.57	.57
Nickel salt, single	Lb.	.12	.11	.11	.11	.11	.10½	.11
Phosphorus, red	Lb.	.45	.45	.45	.45	.45	.45	.45
Potassium bichromate	Lb.	.10½	.10½	.10½	.10½	.09½	.09½	.09½
Potassium bromide, gran.	Lb.	.14	.13½	.18	.17	.17	.17	.17
Carbonate of potash, 80-85%	Lb.	.04½	.04½	.04½	.05	.04½	.05	.05
Chlorate of potash, crystals	Lb.	.05½	.05½	.05½	.06½	.06½	.06½	.06½
Caustic potash, 88-92%	100 lb.	6.00	5.75	6.00	5.80	5.85	5.75	5.75
Permanganate of potash, U.S.P.	Lb.	.14	.13½	.13	.15	.14½	.14	.14
Prussiate of potash, yellow	Lb.	.25	.25	.26	.27	.31	.32	.33
Salt cake, bulk	Ton	17.00	17.00	17.00	18.00	20.00	20.00	20.00
Soda ash, light, 58%	100 lb.	1.75	1.70	1.80	1.80	1.90	1.80	1.75
Bichromate of soda	Lb.	.07½	.07½	.07½	.07½	.07½	.07½	.07½
Fluoride of soda	Lb.	.10½	.09½	.09½	.09½	.09	.10	.09½
Cyanide of soda	Lb.	.26	.23½	.23½	.22	.22	.22	.22
Caustic soda, solid 76%	100 lb.	3.25	3.35	3.65	3.65	3.85	3.80	3.75
Nitrate of soda	100 lb.	2.37½	2.37½	2.85	2.90	2.70	2.55	2.55
Prussiate of soda	Lb.	.17½	.18	.17½	.16½	.21	.22	.21½
Sulphide of soda, 60%	Lb.	.04½	.04½	.04½	.04½	.04½	.04½	.04½
Sulphur, crude	Ton	18.00	18.00	18.00	18.00	18.00	18.00	18.00
Zinc chloride, gran.	Lb.	.09	.09	.06	.05½	.05½	.06	.06
Zinc oxide	Lb.	.07½	.07½	.07½	.07½	.07½	.07½	.07½

The New York Market

NEW YORK, July 2, 1922.

Practically the only trading noticeable in the chemical market during the past week was for small lots of comparatively unimportant commodities. Oxalic acid has been an outstanding feature of the week's activities. Producers have announced an advance at the works and consumers have been buying in moderate proportions. Acetate of soda continued to display a very firm attitude and prices were quoted higher during the latter part of the week. Tartaric acid remained strong, with a good seasonable inquiry recorded from the consuming trades. Copper sulphate is somewhat higher on spot and supplies seem to be very scarce. Caustic soda has shown the effects of its prolonged activity and prices have declined to $3.75 per 100 lb. for export. Potash alum has also been reduced by leading dealers, in addition, prussiate of soda and barium chloride have recorded slight decreases.

GENERAL AND SPECIAL CHEMICALS

Acetate of Soda—It is rather doubtful if better than 6¼c. per lb. can be done for spot goods. Large producers are quoting 5¼@6c. per lb., f.o.b. works, depending on quantity.

Bicarbonate of Soda—Manufacturers quote $1.75 per 100 lb. for barrels, f.o.b. works. There has been no outstanding features of interest in this market, outside of regular contract shipments.

Caustic Soda—The demand for this product has slackened considerably and July shipment is being offered at $3.75 per 100 lb. f.a.s. The domestic demand continued rather steady with 3¾c. per lb. named for spot goods. Contract prices remain at 2¼c. per lb. basis 60 per cent, f.o.b works, for car lots.

Copper Sulphate—The spot market is exceptionally strong with goods practically sold up and dealers quoting July material around 6¼c. per lb.

Muriatic Acid—Large contracts for the 18 deg. acid have been placed as low as 1c. per lb. while the 20 deg. is held at $1.10 per 100 lb.

Oxalic Acid—Sales for spot goods have been recorded around 14¼@15c. per lb. Material at the works is quoted at 14¼@14¾c. per lb.

Potash Alum—Foreign stocks have depressed prices in the local market to 3c. per lb., with the range from 3@3¼c. per lb.

Sulphuric Acid—Producers of this material quote the 66 deg. in tanks at $15@$17 per ton and drums at $18@$20 depending upon the quantity. Sales of 60 deg. were recorded at $9.50@$10 per ton.

WAXES

Beeswax—Crude wax was somewhat easier during the week, due to the increased stocks. Pure white wax was held at 40@45c. per lb.

Candelilla Wax—Spot material was exceptionally scarce and prices ranged around 40c. per lb. for odd lots.

Carnauba Wax — Material on spot was offered in larger amounts than have been noted for several weeks and prices were easier. No. 3 North Country was available at 16¼c. per lb. No. 1 regular was quoted at 40c.

Japan Wax—A better inquiry was noted for this material and prices remained steady during the interval. The market for spot goods was held around 16@16¼c. per lb. Forward business was transacted at 15c. per lb.

NAVAL STORES

Turpentine—During the early part of the week prices showed an advance from $1.25 per gal. to $1.48. Consumers and exporters were not eager to purchase at these high levels and prices reacted to $1.25 per gal. Quotations heard during the latter part of the week ranged around $1.30 per gal.

Rosins—The market showed the effects of the sudden decline in turpentine and all grades were reduced from 5 to 20c. per bbl. B-D was quoted at $5.40 per bbl. and W-G, W-W at $7.65@$8.30 per bbl.

The Iron and Steel Market

PITTSBURGH, June 30, 1922.

The steel market has grown progressively quieter in the past six or eight weeks, as to the actual tonnage turnover, and now at the beginning of the July-August midsummer period is ready for the dullness that usually characterizes those two months.

The trade is prepared for a dull period in the market. The mills are well sold up and buyers as a rule are well covered. In many departments mills are sold up very fully for two months and in some cases for a longer time. Merchant steel bars, in particular, are well sold ahead for about three months.

There is good ground, therefore, for expecting the steel market to weaken in case there is little activity for a number of weeks, or perhaps even for two months. The mills are really quite well fortified. They have more business on their books than even the more sanguine expected at the beginning of the year.

MILLS CONSERVATIVE

The mills as a rule refuse to admit that the lighter turnover in steel products in the open market is due to a change of attitude on the part of buyers. The mills state that the cause is their own reserve in the matter of selling, that they could book large additional tonnages if they cared to accept the business. The mills have endeavored as far as possible to limit their commitments to tonnages sufficient to cover the known requirements of customers.

While it is no doubt true that mills are conservative and could secure more business, in contracts or other form, than they are accepting, it does not follow that buyers also have not become somewhat more conservative. There is probably less disposition than two or three months ago to buy all the steel the mills will sell. There have been developments that would cause buyers to recede from their former position. There is, probably, no decrease in the rate of consumption and no diminution in the good prospects of steel consumers, but there are two developments of consequence, one being the maintenance of steel production in face of the coal strike, the other being the disinclination of steel prices to advance much if any beyond their present level.

Steel sellers and steel buyers alike have ground for allowing the market to drift for a time, and as to the future the chief point to be observed is which party shall first come into the market again in a large way. The crucial test will probably come shortly before or after September 1. The preponderating view seems to be that the mills will have the advantage at that time, whereby there may be a strong market for some time. On the other hand, it is doubtful whether such production of steel as has obtained lately can be continued beyond the end of the present year.

STEEL PRICES

Finished steel prices are quotable as follows: Bars, shapes and plates, 1.60c to 1.70c.; hoops and bands, 2.40c. to 2.50c.; blue annealed sheets, 2.40c. to 2.50c.; black sheets, 3.15c. to 3.30c.; galvanized sheets, 4.15c. to 4.30c.; automobile sheets, 4.50c. to 4.75c.; tin plate, $4.75; wire nails, $2.40 to $2.50; standard steel pipe, 71 per cent basing discount. In commodities in which a price range exists the higher price is usually for early delivery, though the character of specifications has something to do with the price.

THE COAL STRIKE

Rumors are prevalent as to operators beginning to make an effort to break the coal strike next week, these referring both to the Pittsburgh district operators, whose mines have been union, and to the Connellsville region, which has been nonunion for over 30 days, but which has had strikes that hang on rather well. Production in the Connellsville region has been increasing for almost two months, but at a very slow rate, close comparisons being necessary to show any change.

Connellsville coal weakened about 10 cents a ton late last week, but this week has regained the loss, being now quotable at $3.50 to $3.75 for steam mine-run. Connellsville coke is about 50 cents higher in the week, at $8.00 to $8.50. An interesting point is that there is practically no market in regular foundry coke. At most operations it is found difficult to produce coke of regular foundry grade, *i.e*, carefully selected, and rather than jeopardize reputations several operators are offering their coke as coke.

The pig iron market remains practically stagnant, with quotations unchanged, though now largely nominal, at $25 for Bessemer and basic and $24 to $25 for foundry, f.o.b. valley furnaces.

The Chicago Market

CHICAGO, Ill., June 27, 1922.

The demand for industrial chemicals during the past two weeks was rather dull but a slightly better movement was in evidence today. Consumers are holding off to a certain extent waiting for the lower freight rates which will be effective after July 1. This, and the approach of the slow summer season are the reasons given in most quarters for the present dullness and it is also believed that the uncertain tariff situation is having an adverse effect on the market. Prices have been very steady and only a few adjustments were noted while stocks in the hands of both jobbers and consumers were reported as low.

GENERAL CHEMICALS

The alkali market was without change and the movement was only routine. *Ground caustic soda* 76 per cent was quoted at $4.35@$4.50 per cwt. for moderate lots and the solid at $3.85@$3.95. *Caustic potash* lacked quotable change and was reported to be moving in a fair way at 6¼@6¾c. per lb. for the 88-92 per cent material. *Soda ash* was quiet with only a routine movement reported. The 58 per cent material was quoted in cooperage by manufacturers or their agents at $2.20 @$2.30 per cwt.

Alums were in a firm position with prices generally maintained. *Ammonia alum* was quoted at 3¾@4¼c. per lb. for the lumps and 4¼@4¾c. for the powdered. *Potash alum* was in fair demand with the lumps available at 4¼@5c. per lb. and the powdered at 5¼@6c.. *Barium* products were in an easier position with imported material for shipment from the East available at lower prices. *Barium chloride* was offered at $100 per ton for moderate quantities. *Copper sulphate* was very firm and scarce with practically all holders asking 6¼@7c. per lb. for the small lots that they had. Only a routine demand was reported for *sal ammoniac* and the prices were unchanged at 7¾@8c. per lb. for the white granular and 17@18c. for the lump. *White arsenic* attracted but little attention and was available at 8c. per lb. *Carbon bisulphide* was rather slow and only small lots changed hands at 7@ 7½c. per lb. *Carbon tetrachloride* was unchanged both as to demand and price. Large drums were available at 10c. per lb. *Formaldehyde* was very dull and weak with at least one factor offering single bbl. lots at 9c. per lb. delivered.

Refiners advanced their schedules on C. P. *glycerine* to 14¾c. per lb. bulk basis but the demand continued light.

The bichromates were without change in price and moved only in a routine way. *Sodium bichromate* of standard brand was available at 9c. per lb. in single cask lots and similar quantities of the potash salt at 11¾c. One holder was asking $1 per lb. today for *red prussiate of potash* for spot delivery. Small lots were available for shipment from the East at 85@90c. but no quantities were available at any price. The *yellow prussiate of potash* is in a very firm position and only small supplies were available at 34@36c. per lb. *Potassium permanganate* was slightly firmer at 16@16½c. per lb. for the U. S. P. small crystals.

LINSEED OIL

A prominent factor in this field reports a good movement of the oil and says that the tendency is toward slightly higher prices. The movement which is described as good consists mainly of small lots as there is a reluctance on the part of the consumer to anticipate his requirements very far ahead. The boiled oil was quoted today in 5-drum lots at 93c. per gal. and the raw in similar quantities at 91c.

Turpentine is apparently too high priced at the present time to move in very large quantities although dealers report a very good volume of business for small or moderate lots. Today's price for 5-drum lots was $1.25 per gal. *Rosin* was not moving as well as turpentine and the WG grade was quoted at $9 per 280 lb. for less than car lots.

General Chemicals

Current Wholesale Prices in New York Market

		Carlots F.o.b. N.Y.	Less Carlots F.o.b. N.Y.
Acetic anhydride	lb.	..... –	$0.38 – $0.40
Acetone	lb.	$0.10 – $0.10½	.10½– .11
Acid, acetic, 28 per cent	100 lbs.	2.25 – 2.50	2.55 – 3.00
Acetic, 56 per cent	100 lbs.	5.00 – 5.25	5.30 – 5.50
Acetic, glacial, 99½ per cent, carboys, 100 lbs.		8.50 – 9.00	.50 – 9.75
Boric, crystals	lb.	.11 – .11½	.11½– .12
Boric, powder	lb.	.11 – .11½	.11½– .12½
Citric	lb.	..... –	.45 – .46
Hydrochloric	100 lb.	1.10 – 1.20	1.25 – 1.70
Hydrofluoric, 52 per cent	lb.	.11 – .11½	.11½– .12
Lactic, 44 per cent tech	lb.	.09½– .10	.10½– .12
Lactic, 22 per cent tech	lb.	.04 – .04½	.04½– .05
Molybdic, c.p.	lb.	3.00 – 3.25	3.30 – 3.75
Muriatic, 20 deg. (see hydrochloric)		..... –	..... – .....
Nitric, 40 deg	lb.	.06 – .06½	.06½– .07
Nitric, 42 deg	lb.	.06½– .06¾	.07 – .07½
Oxalic, crystals	lb.	.14½– .14¾	.15 – .15½
Phosphoric, 50 per cent solution	lb.	.08 – .08½	.08½– .09½
Picric	lb.	.22 – .24	.24½– .30
Pyrogallic, resublimed	lb.	..... –	1.65 – 1.75
Sulphuric, 60 deg., tank cars	ton	9.50 – 10.00	..... – .....
Sulphuric, 60 deg., drums	ton	12.00 – 14.00	..... – .....
Sulphuric, 66 deg., tank cars	ton	15.00 – 16.00	..... – .....
Sulphuric, 66 deg., drums	ton	19.00 – 20.00	20.50 – 21.00
Sulphuric, 66 deg., carboys	ton	..... –	..... – .....
Sulphuric, fuming, 20 per cent (oleum) tank cars	ton	19.00 – 20.00	..... – .....
Sulphuric, fuming, 20 per cent (oleum) drums	ton	22.00 – 22.50	23.00 – 24.00
Sulphuric, fuming, 20 per cent (oleum) carboys	ton	31.00 – 32.00	33.00 – 34.00
Tannic, U. S. P.	lb.	..... –	.60 – .75
Tannic (tech.)	lb.	.40 – .45	.46 – .50
Tartaric, imported crystals	lb.	..... –	.29 – .29½
Tartaric acid, imported, powdered	lb.	..... –	.29½– .30
Tartaric acid, domestic	lb.	..... –	..... – .30
Tungstic, per lb. of WO	lb.	..... –	1.00 – 1.10
Alcohol, ethyl (Cologne spirit)	gal.	..... –	4.75 – 4.95
Alcohol, methyl (see methanol)		..... –	..... – .....
Alcohol, denatured, 188 proof No. 1	gal.	..... –	.26 – .30
Alcohol, denatured, 188 proof No. 5	gal.	..... –	.26 – .30
Alum, ammonia, lump	lb.	.03½– .03¾	.03½– .04
Alum, potash, lump	lb.	.03 – .03½	.03½– .04
Alum, chrome lump	lb.	.05½– .05¾	.06 – .06½
Aluminum sulphate, commercial	100 lb.	1.50 – 1.65	1.70 – 2.25
Aluminum sulphate, iron free	lb.	.02½– .02¾	.03 – .03½
Aqua ammonia, 26 deg. drums (750 lb.)	lb.	.06½– .07¼	.07½– .08
Ammonia, anhydrous, cyl. (100-150 lb.)	lb.	.30 – .30½	.30½– .31
Ammonium carbonate, powder	lb.	.07 – .07½	.07½– .08
Ammonium nitrate	lb.	.06 – .06½	.06½– .07½
Amylacetate tech	gal.	..... –	2.00 – 2.25
Arsenic, white, powdered	lb.	.07½– .07¾	.07¾– .08
Arsenic, red, powdered	lb.	.12 – .12½	.12½– .13
Barium carbonate	lb.	.03 – .04	.04½– .05
Barium chloride	ton	95.00 – 100.00	105.00 – 110.00
Barium dioxide (peroxide)	lb.	.20 – .21	.21½– .22
Barium nitrate	lb.	.07 – .07½	.07½– .08
Barium sulphate (precip.) (blanc fixe)	lb.	.04 – .04½	.04½– .04¾
Blanc fixe, dry	lb.	.04 – .04½	..... – .....
Blanc fixe, pulp	ton	45.00 – 55.00	..... – .....
Bleaching powder	100 lb.	1.60 – 1.75	1.85 – 2.50
Blue vitriol (see copper sulphate)		..... –	..... – .....
Borax	lb.	.05½– .05¾	.06 – .06¼
Brimstone (see sulphur, roll)		..... –	..... – .....
Bromine	lb.	.27 – .28	.28½– .35
Calcium acetate	100 lbs.	1.75 – 2.00	..... – .....
Calcium carbide	lb.	.04½– .04¾	.05 – .05½
Calcium chloride, fused, lump	ton	24.00 – 24.50	24.75 – 27.00
Calcium chloride, granulated	lb.	.01½– .01¾	.02 – .02½
Calcium peroxide	lb.	..... –	1.40 – 1.50
Calcium phosphate, tribasic	lb.	..... –	.15 – .16
Camphor	lb.	..... –	.80 – .83
Carbon bisulphide	lb.	.06½– .06¾	.07 – .07½
Carbon tetrachloride, drums	lb.	.09½– .10	.10½– .12
Carbonyl chloride, (phosgene)	lb.	..... –	.60 – .75
Caustic potash (see potassium hydroxide)		..... –	..... – .....
Caustic soda (see sodium hydroxide)		..... –	..... – .....
Chalk, precip.—domestic, light	lb.	.04½– .04¾	..... – .....
Chalk, precip.—domestic, heavy	lb.	.03½– .03¾	..... – .....
Chalk, precip.—imported, light	lb.	.04½– .05	..... – .....
Chlorine, gas, liquid-cylinders (100 lb.)	lb.	.05 – .05½	.05½– .06
Chloroform	lb.	..... –	.25 – .32
Cobalt oxide	lb.	..... –	2.00 – 2.10
Copperas	ton	20.00 – 22.00	23.00 – 30.00
Copper carbonate, green precipitate	lb.	.19 – .20	.20½– .21
Copper cyanide	lb.	..... –	.58 – .60
Copper sulphate, crystals	100 lb.	6.50 – 6.60	6.65 – 7.00
Cream of tartar	lb.	..... –	.23½– .25
Epsom salt (see magnesium sulphate)		..... –	..... – .....
Ethyl acetate com. 85%	gal.	..... –	.60 – .65
Ethyl acetate, pure (acetic ether, 98% to 100%)	gal.	..... –	.90 – .95
Formaldehyde, 40 per cent	lb.	.08½– .08¾	.08½– .09
Fullers earth, f.o.b. mines	net ton	16.00 – 17.00	..... – .....
Fullers earth—imported powdered—net	ton	30.00 – 32.00	..... – .....
Fusel oil, ref	gal.	..... –	2.25 – 2.65
Fusel oil, crude	gal.	..... –	1.45 – 1.50
Glauber's salt (see sodium sulphate)		..... –	..... – .....
Glycerine, c. p. drums extra	lb.	..... –	.14½– .15
Iodine, resublimed	lb.	..... –	4.20 – 4.25
Iron oxide, red	lb.	..... –	.12 – .18
Lead acetate	lb.	..... –	.09½– .11½
Lead arsenate, powd	lb.	.13 – .13½	.13½– .14½
Lead nitrate	lb.	..... –	.15 – .20
Litharge	lb.	.07½– .08	.08½– .09
Magnesium carbonate, technical	lb.	.08 – .08½	.08½– .09
Magnesium sulphate, U. S. P.	100 lb.	2.00 – 2.25	2.30 – 2.50
Magnesium sulphate, technical	100 lb.	..... –	1.00 – 1.80
Methanol, 95%	gal.	..... –	.57 – .58
Methanol, 97%	gal.	..... –	.59 – .60
Nickel salt, double	lb.	..... –	.11 – .11½
Nickel salt, single	lb.	..... –	.10 – .10½
Phogene (see carbonyl chloride)		..... –	..... – .....
Phosphorus, red	lb.	..... –	.40 – .45
Phosphorus, yellow	lb.	..... –	.30 – .35

		Carlots F.o.b. N.Y.	Less Carlots F.o.b. N.Y.
Potassium bichromate	lb.	.09½ – .10	.10½ – .10
Potassium bromide, granular	lb.	..... –	.22 – .23
Potassium carbonate, U. S. P.	lb.	.12 – .12½	.13 – .16
Potassium carbonate, 80–85%	lb.	.05 – .05½	.05½ – .06
Potassium chlorate, powdered and crystals	lb.	.06½ – .07	.07½ – .08
Potassium cyanide	lb.	..... –	.50 – .52
Potassium hydroxide (caustic potash)	100 lb.	5.75 – 6.00	6.25 – 6.50
Potassium iodide	lb.	..... –	3.20 – 3.35
Potassium nitrate	lb.	.06½ – .06½	.07 – .08
Potassium permanganate	lb.	.14 – .14½	.14½ – .15½
Potassium prussiate, red	lb.	..... –	.90 – .95
Potassium prussiate, yellow	lb.	.33 – .33½	.33½ – .33½
Rochelle salts (see sodium potas. tartrate)	.....	..... –	..... – .....
Salammoniac, white, granular	lb.	.06½ – .07	.07½ – .08
Salammoniac, gray, granular	lb.	.07½ – .08	.08½ – .08½
Salsoda	100 lb.	1.20 – 1.40	1.45 – 1.60
Salt cake (bulk)	ton	20.00 – 25.00	..... – .....
Soda ash, light, 58 per cent flat, bags, contract	100 lb.	1.65 – 1.70	2.00 – 2.25
Soda ash, light, 58 per cent flat, bags, resale	100 lb.	1.75 – 1.80	1.85 – 2.35
Soda ash, dense, in bags, resale	100 lb.	1.85 – 1.90	1.95 – 2.40
Sodium acetate	lb.	.06½ – .06½	.06½ – .07
Sodium bicarbonate	100 lb.	1.75 – 1.85	1.90 – 2.30
Sodium bichromate	lb.	.07½ – .07½	.07½ – .08
Sodium bisulphate (nitre cake)	ton	4.50 – 4.60	4.65 – 5.50
Sodium bisulphite powdered, U.S.P.	lb.	.04½ – .04½	.04½ – .05½
Sodium chlorate	lb.	.06½ – .06½	.07 – .07½
Sodium chloride	long ton	12.00 – 13.00	..... – .....
Sodium cyanide	lb.	.22 – .23	.23½ – .25
Sodium fluoride	lb.	.09½ – .10	.10½ – .10½
Sodium hydroxide (caustic soda) solid, 76 per cent flat, drums, contract	100 lb.	3.35 – 3.50	3.80 – 4.00
Sodium hydroxide (caustic soda) solid, 76% flat, drums, resale	100 lb.	3.75 – 3.80	3.85 – 4.20
Sodium hydroxide (caustic soda), ground and flake, contracts	100 lb.	3.85 – 4.00	4.30 – 4.50
Sodium hydroxide (caustic soda) ground and flake, resale	100 lb.	4.00 – 4.15	4.40 – 4.60
Sodium hyposulphite	lb.	.03 – .03½	.03½ – .04
Sodium nitrite	lb.	.08½ – .08½	.09 – .09½
Sodium peroxide, powdered	lb.	.28 – .30	.31 – .35
Sodium phosphate, dibasic	lb.	.03½ – .04	.04½ – .04½
Sodium potassium tartrate (Rochelle salts)	lb.	..... –	.18 – .21
Sodium prussiate, yellow	lb.	.21½ – .22	.22½ – .22½
Sodium silicate, (40 deg. in drums)	100 lb.	.80 – 1.00	1.05 – 1.25
Sodium silicate, (60 deg. in drums)	100 lb.	2.25 – 2.40	2.45 – 2.75
Sodium sulphate, crystals (glaubers salt)	100 lbs.	.90 – 1.00	1.05 – 1.50
Sodium sulphide, fused, 60-62 per cent (conc.)	lb.	.04½ – .04½	.04½ – .05
Sodium sulphite, crystals	lb.	.03½ – .03½	.03½ – .04½
Strontium nitrate, powdered	lb.	.09½ – .10	.10½ – .12
Sulphur chloride, yellow	lb.	.04½ – .05	.05½ – .06
Sulphur, crude	ton	18.00 – 20.00	..... – .....
Sulphur dioxide, liquid, cylinders extra	lbs.	.08 – .08½	.09 – .10
Sulphur (sublimed), flour	100 lb.	..... –	2.25 – 3.10
Sulphur, roll (brimstone)	100 lb.	2.00 – 2.15	2.20 – 2.70
Talc—imported	ton	30.00 – 40.00	..... – .....
Talc—domestic powdered	ton	18.00 – 25.00	..... – .....
Tin bichloride	lb.	.09 – .09½	.09½ – .10
Tin oxide	lb.	..... –	.35 – .37
Zinc carbonate	lb.	.14 – .14½	.14½ – .15½
Zinc chloride, gran.	lb.	.06 – .06½	.06½ – .07
Zinc cyanide	lb.	.42 – .44	.45 – .47
Zinc oxide, XX	lb.	.07½ – .08	.08½ – .08½
Zinc sulphate	100 lb.	2.75 – 3.00	3.05 – 3.30

Coal-Tar Products

NOTE—These prices are for original packages in large quantities f.o.b. N.Y.:

Alpha-naphthol, crude	lb.	$1.00 —	$1.05
Alpha-naphthol, refined	lb.	1.10 —	1.15
Alpha-naphthylamine	lb.	.30 —	.31
Aniline oil, drums extra	lb.	.14 —	.16
Aniline salts	lb.	.22 —	.24
Anthracene, 80% in drums (100 lb.)	lb.	.75 —	1.00
Benzaldehyde U.S.P.	lb.	1.25 —	1.30
Benzene, pure, water-white, in drums (100 gal.)	gal.	.30 —	.35
Benzene, 90%, in drums (100 gal.)	gal.	.28 —	.32
Benzidine, base	lb.	.85 —	.95
Benzidine sulphate	lb	.80 —	.85
Benzoic acid, U.S.P.	lb.	.60 —	.65
Benzoate of soda, U.S.P.	lb.	.50 —	.55
Benzyl chloride, 95-97%, refined	lb.	.25 —	.27
Benzyl chloride, tech.	lb.	.20 —	.23
Beta-naphthol benzoate	lb.	3.75 —	4.00
Beta-naphthol, sublimed	lb.	.50 —	.55
Beta-naphthol, tech	lb.	.23 —	.26
Beta-naphthyla mine, sublimed	lb.	1.50 —	1.60
Carbazol	lb.	.75 —	.90
Cresol, U. S. P., in drums (100 lb.)	lb.	.12 —	.15
Ortho-cresol, in drums (100 lb.)	lb.	.16 —	.18
Cresylic acid, 97–99%, straw color, in drums	gal.	.56 —	.65
Cresylic acid, 95-97%, dark, in drums	gal.	.51 —	.58
Dichlorbenzene	lb.	.06 —	.09
Diethylaniline	lb.	.65 —	.70
Dimethylaniline	lb.	.36 —	.38
Dinitrobenzene	lb.	.20 —	.22
Dinitroclorbenzene	lb.	.22 —	.24
Dinitronaphthalene	lb.	.30 —	.32
Dinitrophenol	lb	.33 —	.35
Dinitrotoluene	lb.	.22 —	.24
Dip oil, 25%, car lots, in drums	gal.	.24 —	.26
Diphenylamine	lb.	.59 —	.65
H-acid	lb.	.85 —	.95
Meta-phenylenediamine	lb.	.95 —	1.00
Monochlorbenzene	lb.	.09 —	.11
Monoethylaniline	lb.	1.00 —	1.20
Naphthalene crushed, in bbls.	lb.	.06 —	.06½
Naphthalene, flake	lb.	.06½ —	.07
Naphthalene, balls	lb.	.07½ —	.08
Naphthionate of soda	lb.	.58 —	.65
Naphthionic acid, crude	lb.	.65 —	.70
Nitrobenzene	lb.	.10 —	.12
Nitro-naphthalene	lb.	.30 —	.35
Nitro-toluene	lb.	.15 —	.17
N-W acid	lb.	1.15 —	1.30
Ortho-amidophenol	lb.	2.40 —	2.50
Ortho-dichlor-benzene	lb.	2.15 —	.20
Ortho-nitro-phenol	lb.	.70 —	.75
Ortho-nitro-toluene	lb.	$0.10 —	$0.13
Ortho-toluidine	lb.	.14 —	.18
Para-amidophenol, base	lb.	1.25 —	1.30
Para-amidophenol, HCl	lb.	1.30 —	1.35
Para-dichlorbenzene	lb.	.17 —	.20
Paranitroaniline	lb.	.72 —	.75
Para-nitrotoluene	lb.	.55 —	.65
Para-phenylenediamine	lb.	1.55 —	1.60
Para-toluidine	lb.	.90 —	1.00
Phthalic anhydride	lb.	.35 —	.38
Phenol, U. S. P., drums	lb.	.14 —	.15
Pyridine	gal.	1.75 —	2.75
Resorcinol, technical	lb.	1.30 —	1.35
Resorcinol, pure	lb.	1.75 —	1.80
R-salt	lb.	.60 —	.70
Salicylic acid, tech., in bbls.	lb.	.25 —	.25½
Salicylic acid, U. S. P.	lb.	.26 —	.26½
Solvent naphtha, water-white, in drums, 100 gal.	gal.	.27 —	.32
Solvent naphtha, crude, heavy, in drums, 100 gal.	gal.	.14 —	.18
Sulphanilic acid, crude	lb.	.24 —	.26
Toluidine	lb.	1.20 —	1.30
Toluidine, mixed	lb.	.30 —	.35
Toluene, in tank cars	gal.	.25 —	.28
Toluene, in drums	gal.	.30 —	.35
Xylidines, drums, 100 gal.	lb.	.40 —	.45
Xylene, pure, in drums	gal.	.40 —	.45
Xylene, pure, in tank cars	gal.	.45 —	.....
Xylene, commercial, in drums, 100 gal.	gal.	.33 —	.35
Xylene, commercial, in tank cars	gal.	.30 —	.....

Waxes

Prices based on original packages in large quantities f.o.b. N.Y.

Bayberry Wax	lb.	$0.21 —	$0.22
Beeswax, refined, dark	lb.	.30 —	.32
Beeswax, refined, light	lb.	.34 —	.35
Beeswax, white pure	lb.	.40 —	.42
Candellila, wax	lb.	.40 —	.42
Carnauba, No. 1	lb.	.40 —	.42
Carnauba No. 2, North Country	lb.	.24 —	.25
Carnauba, No. 3, North Country	lb.	.16½ —	.16½
Japan	lb.	.16 —	.16½
Montan, crude	lb.	.04½ —	.04½
Paraffine waxes, crude match wax (white) 105-110 m.p.	lb.	.04½ —	.....
Paraffine waxes, crude, scale 124-126 m.p.	lb.	.02½ —	.....
Paraffine waxes, refined, 118-120 m.p.	lb.	.03½ —	.03½
Paraffine waxes, refined, 125 m.p.	lb.	.03½ —	.03½
Paraffine waxes, refined, 128-130 m.p.	lb.	.04 —	.04½
Paraffine waxes, refined, 133-135 m.p.	lb.	.04½ —	.04½
Paraffine waxes, refined, 135-137 m.p.	lb.	.05 —	.05½
Stearic acid, single pressed	lb.	.09 —	.09½
Stearic acid, double pressed	lb.	.09½ —	.09½
Stearic acid, triple pressed	lb.	.10½ —	.10½

Naval Stores

All prices are f.o.b. New York unless otherwise stated, and are based on carload lots. The oils in 50-gal. bbls., gross weight, 500 lb.

Rosin B-D, bbl.	280 lb.	$5.40 —	$5.80
Rosin E-I	280 lb.	5.85 —	6.40
Rosin K-N	280 lb.	6.45 —	7.60
Rosin W. G.-W. W.	280 lb.	7.65 —	8.30
Wood rosin, bbl.	280 lb.	6.25 —	.....
Spirits of turpentine	gal.	1.30 —	1.35
Wood turpentine, steam dist.	gal.	.85 —	.....
Wood turpentine, dest. dist.	gal.	.70 —	.70
Pine tar pitch, bbl.	200 lb.	..... —	6.00
Tar, kiln burned, bbl. (500 lb.)	bbl.	..... —	10.00
Retort tar, bbl.	500 lb.	—	9.00
Rosin oil, first run	gal.	.36 —	.....
Rosin oil, second run	gal.	.38 —	.....
Rosin oil, third run	gal.	.46 —	.....
Pine oil, steam dist., sp.gr., 0.930-0.940	gal.		1.00
Pine oil, pure, dest. dist.	gal.		.95
Pine tar oil, ref., sp.gr. 1.025-1.035	gal.		.46
Pine tar oil, crude, sp.gr. 1.025-1.035 tank cars f.o.b. Jacksonville, Fla.	gal.		.35
Pine tar oil, double ref., sp.gr. 0.965-0.990	gal.		.75
Pine tar, ref., thin, sp.gr., 1.080-1.960	gal.		.25
Hardwood oil, f.o.b. Mich., sp.gr., 0.960-0.990	gal.		.25
Pinewood creosote, ref.	gal.		.52

Fertilizers

Ammonium sulphate, f.a.s., N.Y.	100 lb.	3.35 —	3.45
Blood, dried, f.o.b., N. Y.	unit	3.50 —	3.60
Bone, 3 and 50, ground, raw	ton	32.00 —	35.00
Fish scrap, dom., dried, f.o.b. works	unit	3.10 —	3.20
Nitrate of soda	100 lb.	2.55 —	2.60
Tankage, high grade, f.o.b. Chicago	unit	3.10 —	3.20
Phosphate rock, f.o.b. mines, Florida pebble, 68-72%	ton	3.50 —	3.75
Tennessee, 78-80%	ton	7.00 —	7.50
Potassium muriate, 80%	ton	33.00 —	33.50
Potassium sulphate	unit	1.00 —	.....

Crude Rubber

Para—Upriver fine	lb.	$0.18 —	.18½
Upriver coarse	lb.	.12½ —	.12½
Upriver caucho ball	lb.	.13½ —	.14
Plantation—First latex crepe	lb.	.15½ —	.15½
Ribbed smoked sheets	lb.	.15½ —	.15½
Brown crepe, thin, clean	lb.	.13½ —	.....
Amber crepe No. 1	lb.	.14½ —	.....

Oils

VEGETABLE

The following prices are f.o.b. New York for carload lots.

Castor oil, No. 3, in bbls.	lb.	$0.11 —	$0.11½
Castor oil, AA, in bbls.	lb.	.12 —	.12½
China wood oil, in bbls.	lb.	.13½ —	.14

Coconut oil, Ceylon grade, in bbls	lb.	.08½ —	.08¾
Cocoanut oil, Cochin grade, in bbls	lb.	.09¼ —	.09½
Corn oil, crude, in bbls	lb.	.11¼ —	.11½
Cottonseed oil, crude (f. o. b. mill)	lb.	$0.10 —	$0.10
Cottonseed oil, summer yellow	lb.	.11¾ —	.12
Cottonseed oil, winter yellow	lb.	.12 —	.13
Linseed oil, raw, car lots (domestic)	gal.	.87 —	.88
Linseed oil, raw, tank cars (domestic)	gal.	.83 —	.84
Linseed oil, boiled, in 5-bbl lots (domestic)	gal.	.92 —	.93
Olive oil, denatured	gal.	1.15 —	1.17
Palm, Lagos	lb.	.07½ —	.07
Palm, Niger	lb.	.06½ —	.06
Peanut oil, crude, tank cars (f.o.b. mill)	lb.	.09¾ —	.10
Peanut oil, refined, in bbls	lb.	.12½ —	.12¾
Rapeseed oil, refined in bbls	gal.	.84 —	.85
Rapeseed oil, blown, in bbls	gal.	.88 —	.89
Soya bean oil (Manchurian), in bbls. N. Y.	lb.	.12¼ —	....
Soya bean oil, tank cars, f.o.b., Pacific coast	lb.	.10¼ —	....
FISH			
Light pressed menhaden	gal.	$0.51 —	....
Yellow bleached menhaden	gal.	.53 —	.54
White bleached menhaden	gal.	.55 —	.56
Blown menhaden	gal.	.61 —	....
Whale Oil, No. 1. crude, tanks, coast	gal.	.45 —	.48

Miscellaneous Materials

All f.o.b. New York, Unless Otherwise Stated

Asbestos, crude No. 1, f.o.b., Quebec, Canada	short ton	$900 00	$1200.00
Asbestos, shingle stock, f.o.b., Quebec, Canada	short ton	90 00	—125.00
Asbestos, cement stock, f.o.b., Quebec, Canada	short ton	22.00	— 28.00
Barytes, ground, white, f.o.b. mills	net ton	17 00	— 23.00
Barytes, ground, off color f.o.b. mills	net ton	13.00	— 21.00
Barytes, floated, f.o.b. St. Louis	net ton	23.00	— 24 00
Barytes, crude f.o.b. mines	net ton	8.00	— 9.00
Casein	lb.	.14	— .15
China clay (kaolin) crude, f.o.b. mines, Georgia	net ton	6.00	— 8.00
China clay (kaolin) washed, f.o.b. Georgia	net ton	8.00	— 9.00
China clay (kaolin) powdered, f.o.b. Georgia	net ton	12.00	— 20.00
China clay (kaolin) crude f.o.b. Virginia points	net ton	8.00	— 12.00
China clay (kaoli n)ground, f.o.b. Virginia points	net ton	13.00	— 20.00
China clay (kaolin), imported, lump	net ton	14.00	— 20.00
China clay (kaolin), imported, powdered	net ton	30.00	— 35.00
Feldspar, No. 1 pottery grade	long ton	6.40	— 6.75
Feldspar, No. 2 pottery grade	long ton	5.75	— 5.90
Feldspar, No. 1 soap grade	long ton	7.00	— 7.50
Feldspar, No. 1 Canadian, for mill	long ton	21.00	— 22.00
Graphite, Ceylon lump, first quality, f.o.b. N. Y.	lb.	.05	— .05½
Graphite, Ceylon chip	lb.	.04	— .04½
Graphite, high grade amorphous crude	ton	35.00	— 50.00
Kieselguhr, f.o.b. mines, Cal.	per ton	40.00	— ....
Kieselguhr, f.o.b. N. Y.	per ton	55.00	— 60.00
Magnesite, calcined (crude)	per ton	8.00	— 12.00
Pumice stone, imported	lb.	.03	— .05
Pumice stone, domestic, lump	lb.	.05	— .05½
Pumice stone, domestic, ground	lb.	.06	— .07
Shellac, orange fine	lb.	.81	— .82
Shellac, orange superfine	lb.	.83	— .84
Shellac, A. C. garnet	lb.	.68	— .69
Shellac, T. N.	lb.	.79	— .80
Silica, glass sand, f.o.b. Indiana	per ton	1.25	— 2.25
Silica, sand blast material, f.o.b. Indiana	per ton	2.25	— 4.50
Silica, amorphous, 250 mesh, f.o.b. Illinois	per ton	16.00	— 16.00
Silica, building sand, f.o b. Pa	per ton	2.00	— 2.75
Soapstone	ton	12.00	— 15.00
Talc, 200 mesh, f.o.b. Vermont	ton	7.00	— 12.00
Talc, 200 mesh, f.o.b. Georgia	ton	7.50	— 12.00
Talc, 200 mesh, f.o.b. Los Angeles	ton	16.00	— 20.00

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	per 1,000	$130.00
Chrome brick, f.o.b. Eastern shipping points	net ton	40–42
Chrome cement, 40-50% Cr_2O_3	net ton	24–32
Chrome cement, 40-45% Cr_2O_3, sacks, in car lots, f.o.b. Eastern shipping points	net ton	23.00
Fireclay brick, 1st quality, 9-in. shapes, f.o.b. Pennsylvania, Ohio and Kentucky works	1,000	28–35
Fireclay brick, 2nd quality, 9-in. shapes, f.o.b. Pennsylvania, Ohio and Kentucky works	1,000	26–28
Magnesite brick, 9-in. straight (f.o b. works)	net ton	53
Magnesite brick, 9-in. arches, wedges and keys	net ton	70
Magnesite brick, soaps and splits	net ton	90
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	30–32
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	33–35
Silica brick, 9-in. sizes, f.o.b. Mt. Union, Pa.	1,000	27–30
Silicon carbide refractory brick, 9-in.	1,000	1100.00

Ferro-Alloys

Ferrotitanium, 15-18%, f.o.b. Niagara Falls, N. Y.	net ton	$200.00 —	$225.00
Ferrochromium, per lb. of Cr contained, 6–8% carbon, carlots	lb.	.11 —	....
Ferrochromium, per lb. of Cr contained, 4-6% carbon, carlots	lb.	.12 —	....
Ferromanganese, 78-82% Mn, domestic	gross ton	67.00 —	69.00
Ferromanganese, 78-82% Mn, German	gross ton	66.00 —	66.50
Spiegeleisen, 19-21% Mn	gross ton	36.00 —	....
Ferromolybdenum, 50-60% Mo, per lb. of Mo	lb.	2.00 —	2.25
Ferrosilicon, 10-15%	gross ton	38.00 —	40.00
Ferrosilicon, 50%	gross ton	58.00 —	60.00
Ferrosilicon 75%	gross ton	115.00 —	120.00
Ferrotungsten, 70-80%, per lb. of contained W	lb.	.45 —	.50
Ferro-uranium, 35-50% of U, per lb. of U content	lb.	6.00 —	....
Ferrovanadium, 30-40% per lb. of contained V.	lb.	3.50 —	4.00

Ores and Semi-finished Products

All f.o.b. New York Unless Otherwise Stated

Bauxite, domestic, crushed and dried	net ton	$6.00 —	$9.00
Chrome ore, Calif. concentrates, 50% min. Cr_2O_3	ton	20.00 —	21.00
Chrome ore, 50% Cr_2O_3, f.o.b. Atlantic seaboard	ton	20 00 —	21.00
Coke, foundry, f.o.b. ovens	net ton	8.00 —	8.50
Coke, furnace, f.o.b. ovens	net ton	8.00 —	8.00
Fluorspar, gravel, f.o.b. mines, New Mexico	net ton	15.00 —	.....
Fluorspar, standard, domestic washed gravel Kentucky and Illinois mines	net ton	17.50 —	19 00
Ilmenite, 52% TiO_2, per lb. ore	lb.	.01½ —	.01½
Manganese ore, 50% Mn, c.i.f. Atlantic seaport	unit	.27½ —	.28
Manganese ore, chemical (MnO_2)	net ton	60.00 —	65.00
Molybdenite, 85% MoS_2, per lb. of MoS_2, N. Y.	lb.	.50 —	.....
Monazite, per unit of ThO_2, c.i.f., Atlantic seaport	unit	27.00 —	.....
Pyrites, Spanish, fines, c.i.f., Atlantic seaport	unit	.10½ —	.11
Pyrites, Spanish, furnace size, c.i.f. Atlantic seaport	unit	.12 —	.13½
Pyrites, domestic, fines, f.o.b. mines, Ga	unit	Nominal	
Rutile, 95% TiO_2 per lb. ore	lb.	.12 —	.....
Tungsten, scheelite, 60% WO_3 and over, per unit of WO_3 (nominal)	unit	3.00 —	3.25
Tungsten, wolframite, 60% WO_3 and over, per unit of WO_3, N. Y. C.	unit	3.25 —	3.50
Uranium ore (carnotite) per lb. of U_3O_8	lb.	1.25 —	1.75
Uranium oxide, 96% per lb. contained U_3O_8	lb.	2.25 —	2.50
Vanadium pentoxide, 99%	lb.	12.00 —	14.00
Vanadium ore, per lb. of V_2O_5 contained	lb.	1.00 —	.....
Zircon, washed, iron free, f.o.b. Pablo, Florida	lb.	.04½ —	.13½

Non-Ferrous Metals

All f.o.b. New York Unless Otherwise Stated

	Cents per Lb.
Copper, electrolytic	13.875
Aluminum, 98 to 99 per cent	19.00–20.00
Antimony, wholesale lots, Chinese and Japanese	4.95–5 00
Nickel, ordinary (ingot)	36.00
Nickel, electrolytic	39.00
Nickel, electrolytic, resale	32 00–33.00
Nickel, ingot and shot, resale	30.00–31.00
Monel metal, shot and bl cks	32 00
Monel metal, ingots	35.00
Monel metal, sheet bars	38.00
Tin, 5-ton lots, Straits	30.75
Lead, New York, spot	5 75
Lead, E. St. Louis, spot	5.50–5 55
Zinc, spot, New York	5.625
Zinc, spot, E. St. Louis	5.275

OTHER METALS

Silver (commercial)	oz.	$0.70¼	
Cadmium	lb.	1.20–1.25	
Bismuth (500 lb. lots)	lb.	2.00@2.10	
Cobalt	lb.	3.00@3.25	
Magnesium, ingots, 99 per cent	lb.	1.10	
Platinum	oz.	87.50	
Iridium	oz.	170.00@175.00	
Palladium	oz.	55.00@ 60.00	
Mercury	75 lb.	54.75@ 55.00	

FINISHED METAL PRODUCTS

	Warehouse Price, Cents per Lb.
Copper sheets, hot rolled	20.25
Copper bottoms	27.75
Copper rods	19.25
High brass wire	16.75
High brass rods	14.25
Low brass wire	18.25
Low brass rods	18.75
Brazed brass tubing	23.00
Brazed bronze tubing	28.00
Seamless copper tubing	20.75
Seamless high brass tubing	18.00

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

Copper, heavy and crucible	10.25@10.50
Copper, heavy and wire	10.00@10.25
Copper, light and bottoms	7.75@ 8.25
Lead, heavy	3.90@ 4.15
Lead, tea	2½–2¾
Brass, heavy	4.50@ 4.75
Brass, light	4.00@ 4.25
No. 1 yellow brass turnings	4.00@ 4.25
Zinc	2.00@ 2.25

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes	$2.58	$2.58
Soft steel bars	2.48	2.48
Soft steel bar shapes	2.48	2.48
Soft steel bands	2.98	3.08
Plates, ¼ to 1 in. thick	2.58	2.58

Industrial

Financial, Construction and Manufacturers' News

Construction and Operation

Alabama

BIRMINGHAM—The Tennessee Coal, Iron & Railroad Co. is perfecting plans for the early erection of a new foundry for the production of steel castings at the plant of its subsidiary organization, the Chickasaw Shipbuilding & Car Co., Fairfield, Ala. The company is also planning for the remodeling of the foundry at its Ensley, Ala., works, with extensive increase in capacity for the production of iron castings, ingot molds, etc.

California

PITTSBURG—The Pioneer Rubber Co., 68 Sacramento St., San Francisco, will soon call for bids for the erection of a 1-story building here, 80x200 ft., estimated to cost about $150,000, including equipment. Benjamin G. McDougall, 381 Bush St., San Francisco, is architect.

OAKLAND—The Pennzoil Co., Oil City, Pa., affiliated with the Penn-American Refining Co., has acquired property, totaling about 2 acres on Powell St., near San Pablo Ave., for the construction of a new plant for Pacific Coast Service. Plans will be prepared at an early date.

Connecticut

HARTFORD—The Skat Co., Francis Ave., manufacturer of soaps, soap powders, etc., will call for bids at once for the erection of a 1-story plant addition, 46x61 ft. Plans have been prepared by F. C. Walz, architect, Hartford.

MANCHESTER—The Oxford Soap Co. will soon commence the erection of its proposed new plant on Hilliard St., to be 2- and 3-story, 70x150 ft. Plans have been completed. The structure will be used as an addition to its existing works.

Illinois

ROCK ISLAND—The Service Rubber Co., 401 Central Trust Bldg., is taking bids on a general contract for the erection of a new 3-story plant, 60x200 ft., estimated to cost about $100,000, including machinery. Carrin & Horn, 311 Safety Bldg., are architects. J. T. Crowley is one of the heads of the company.

Indiana

ST. MARYS—Joseph Entwhistle has leased the former plant of the Terre Haute Vitrified Brick Co., St. Marys, near Terre Haute, and is organizing a company to operate the property. The plant has been closed down for about 2 years past. The new owner will make a number of improvements, and will remodel the works for the production of face brick, instead of paving brick as heretofore produced. It is planned to commence operations at an early date and develop a maximum production of 40,000 bricks per day.

INDIANAPOLIS—The Majestic Tire & Rubber Co. has acquired a portion of the brewing plant at Crouse and Daly Sts., heretofore owned by the Home Brewing Co., for a consideration of about $32,000. The structure will be remodeled for a new rubber mill.

BIPPUS—The Bippus Tile Co. has been reorganized under the name of the Bippus Clay Products Co., with capital of $55,000, the new company being headed by H. V. D. King, Godhen, Ind., and associates. A tract of 36 acres of land adjoining the present plant has been acquired, and plans are under way for extensive operations. The company will manufacture tile and other burned clay products. John H. Sell, Bippus, is interested in the new organization.

PRINCETON—The Premier Refining Co., a subsidiary of the Consolidated Oil Development Co., recently organized, has work under way on a new gasoline process plant in the Oatsville field, near Princeton. A crude oil plant will also be operated by the company, and plans are now being perfected for the establishment of a distributing plant on site selected at Princeton. C. L. Herber, Terre Haute, is president; and L. C. Nicholson, Indianapolis, vice-president.

Kansas

ARKANSAS—The Moore Refining Co., recently organized with a capital of $1,000,000, has acquired the local oil refinery of the Milliken Refining Co., and has placed the plant in operation. The refinery has a capacity of 2,500 bbl. per day, and tentative plans are under consideration to increase this to more than 5,000 bbl. daily, with the construction of a large extension. George N. Moore, formerly president of the Shaffer Oil & Refining Co., Chicago, Ill., heads the new organization. E. R. Perry and W. R. Layne, both of Tulsa, Okla., are interested in the new company.

WICHITA—The Kansas-Texas Oil Co., a subsidiary of the Kansas-Texas Oil Corp. of New York, has acquired the local refinery and lubricating oil plant of the Derby Oil Co. Possession will be taken on July 1, and extensive operations are planned. The refinery has a rating of 1,800 bbl. per day, and was secured for a consideration of about $100,000. The Derby company is completing the erection of a new oil refinery on an adjoining tract, and will commence production at an early date. This latter plant will have an output of about 5,000 bbl. per day.

Louisiana

ALEXANDRIA—Bonds have been approved in an amount of $110,000, for the construction of a new municipal gas plant. Plans will be prepared at an early date. The City Council is in charge.

Maine

FAIRFIELD—The Keyes Fibre Co., has work under way on enlargements in its local pulp mill. A new conveying system will be installed in connection with other equipment for increased production.

Maryland

TEXAS—The Maryland Calcite Co., P. O. Box 102, recently organized with a capital of $100,000, has plans under way for the erection of a new local plant for the manufacture of whiting, marble flour and kindred specialties. Three 1-story buildings will be constructed, 20x88 ft., 16x20 ft., and 14x20 ft., respectively. The installation will comprise crushing machinery, rolls, elevating equipment, buhr mills, screens, etc., to provide for an initial output of about 100 tons per day. R. L. Lovell is president, and Richard E. Tome, secretary.

BALTIMORE—The Standard Acid Works, Inc., 1150 South Division St., will commence the immediate installation of a new steel tank and auxiliary equipment at its plant.

FROSTBURG—The Frostburg Sewer Pipe Co. is being organized with a capital of $200,000, to construct and operate a local plant for the manufacture of vitrified sewer pipe and affiliated burned clay products. A site for the plant has been selected, including clay properties for raw material supply. It is said that the initial works will cost in excess of $50,000. The Frostburg Commercial Club, T. C. Carrington, secretary, is interested in the project.

Massachusetts

PEABODY—The Wetan Leather Co., Danversport, Mass., has acquired the local plant of the Formal Leather Co., Central St. The structure will be remodeled and occupied by the new owner for the manufacture of a general line of upper leather. It will be used to replace the Danversport plant lately destroyed by fire.

Michigan

LAWTON—The Scnlangen Brothers Co., 2435 Irving Park Blvd., Chicago, Ill., manufacturer of machine equipment, etc., has acquired a site at Lawton, for the erection of a new plant, 50x400 ft., for the manufacture of brass products. It is said that the present plant of the company will be removed to the new location in the near future.

LANSING—The Lansing Paint & Color Co., operating at the plant of the Lansing Chemical Co., acquired a number of months ago, will electrify all departments of the works heretofore using steam power, and will abandon the latter type of operation entirely.

CADILLAC—The Cadillac Malleable Iron Co., is completing the erection of a new foundry and will install equipment at an early date. It is planned to commence production at the plant early in the fall, giving employment to about 100 men. J. C. Ford is president, and George T. Mitchell, vice-president.

Nebraska

OMAHA—The Metropolitan Utilities District has plans under consideration for the installation of a new filtration plant at the waterworks, to cost about $600,000, including equipment. Plans will be prepared at once. F. D. Wead is chairman of the board.

New Jersey

YARDVILLE—The Spartan Rubber Co. has been organized with a capital of $100,000, to take over and operate the local plant of the Zee Zee Rubber Co., recently acquired from the receiver by Edward D. Newman, 29 Broadway, New York, N. Y., for $58,000, and who will be vice-president and secretary of the new organization. The plant will be improved in a number of departments and operations resumed at an early date for the manufacture of tires and other rubber products. It is planned to give employment to about 200 men, under a full time production schedule. Arthur Newman is president of the company, and Stanley Newman, treasurer.

NEWARK—The Premier Rubber Co., recently organized, has acquired the factory buildings at 218-24 New St., at Hoyt St., for the establishment of a new plant for the manufacture of rubber products. Equipment will be installed at once and it is proposed to commence production early in August.

DELAIR—The Kieckhefer Paper Co., Thorne St., Camden, has construction under way on its proposed new local plant for the manufacture of paper containers and kindred products. J. W. Kieckhefer is president.

PERTH AMBOY—The Perth Amboy Oil & Terminal Co., First National Bank Bldg., recently organized, has plans nearing completion for the construction of its proposed oil distributing plant on site, lately acquired at Woodbridge, near Perth Amboy. The new plant will consist of a number of buildings, estimated to cost $130,000, including tanks, machinery, etc. It will give employment to more than 150 men. Luke Mooney is president, and John E. Toolan, secretary.

New York

AMBOY—The Syracuse Pottery Co., 711 East Division St., Syracuse, has awarded a contract to Grassman, Jackson & Hunter, South Crouse Ave., Syracuse, for the construction of a new plant at Amboy. It will be 1-story, 40x140 ft., including kiln department. Work will be commenced at once.

North Carolina

WINSTON-SALEM—The John Reich Co., manufacturer of paints, varnishes, etc., has plans under way for the construction of a 2-story plant, 60x75 ft., to replace its factory recently destroyed by fire.

Ohio

BELLAIRE—The C. L. Dorer Foundry Co. has awarded a contract to the Riverside Bridge Co., Martins Ferry, O., for the construction of a 1-story addition to its foundry, 32x60 ft. C. L. Dorer is president and general manager.

NEWTON FALLS—The Newton Steel Co. has awarded a contract to the McClintic-Marshall Co., Pittsburgh, Pa., for the construction of a new plant addition, estimated to cost close to $750,000, including machinery. It will be equipped as a sheet mill.

Oklahoma

ARDMORE—R. H. Harris & Son, Ada, Okla., have plans in progress for the construction of a local brick-manufacturing plant, with capacity of 20,000 bricks daily.

Pennsylvania

GLASSMERE—Fire, June 19, destroyed a portion of the local plant of the Allegheny Plate Glass Co., with loss estimated at about 50,000, including equipment.

destroyed structure was 3-story, 50x100 ft., and was used primarily for a clay pot department. It is planned to rebuild at once.

PHILADELPHIA — Thomas Savill's Sons, 1310 Wallace St., manufacturers of pipe, etc., have awarded a contract to Seeds & Steinmetz, 1101 Divinity Pl., for the construction of their proposed 2-story foundry, 52x60 ft., at 635-37 North Watts St.

PITTSBURGH — Fire, June 21, destroyed two buildings at the plant of the Ball Chemical Co., Butler Plank Road, Wittmer district, with loss approximating $200,000, including equipment. The company manufactures paints, varnishes, etc. Its headquarters are in the Fulton Bldg. It is said that the plant will be rebuilt at an early date.

PHILADELPHIA—The Shingle Leather Co., 315 Vine St., has taken title to property at 54th St. and Grays Ferry Ave., 120x300 ft., to be used as a site for the construction of a 1-story plant, estimated to cost $50,000, for which contract recently was awarded to the Bowden Construction Co., 1713 Sansom St. Work will be placed under way at once.

NEW OXFORD—The Susquehanna Casting Co., Wrightsville, Pa., manufacturer of iron and steel castings, has commenced the construction of a new local foundry on property recently acquired.

South Carolina

GREENVILLE—The city Water Commission is planning for the installation of a new chlorinating plant at the municipal water works. W. C. Beecham is chairman.

Tennessee

KNOXVILLE—The Davis Mfg. Co. has plans in progress for the construction of a 4-story and basement plant on Asylum Ave., to be equipped for the manufacture of extracts. It will cost close to $250,000, with equipment. Grover C. Davis is president.

COLUMBIA — The American Agricultural Chemical Co., 2 Rector St., New York, N. Y., is reported to be planning for the construction of a new plant here, for the manufacture of commercial fertilizers, with capacity of about 150 tons per day.

Texas

WICHITA FALLS — The Texhoma Oil & Refining Co. has acquired the local oil-refining plant of the Bankers' Refinery Co., and will place the works in operation at once. It is proposed to develop an output of close to 4,000 bbl. per day.

Virginia

FREDERICKSBURG — The Natural Tanning Extract Co. has taken over the local dye plant of Walter Wilson & Brothers, and will operate the works for the manufacture of tanning extracts, including sumac, etc. The companies are affiliated. Walter Wilson is president of both organizations.

West Virginia

NITRO—The Charleston Paper Mfg. Co., Charleston, W. Va., has plans nearing completion for the establishment of its proposed paper-manufacturing plant on local property, improved with a number of buildings, lately acquired. The works will be remodeled; the main structure will be 60x560 ft. The project will involve about $400,000, with machinery. Charles G. Hartje, Steubenville, O., is president.

Canada

KIMBERLEY, ONT.—The Consolidated Mining & Smelting Co., Ltd., Montreal, Que., will commence the immediate erection of its proposed new concentrating plant on site near Kimberley, estimated to cost in excess of $1,000,000. It will be electrically operated in all departments and will have an initial capacity of close to 1,500 tons per day.

New Companies

THE ENGLISH CHEMICAL CO., Paterson, N. J., has been incorporated with a capital of $25,000, to manufacture chemicals and chemical byproducts. The incorporators are Fred G. Parker, Henry Benkes, Jr., and Henry Smith, 297 Main St., Paterson.

THE BLACK-IRON STOVE POLISH CO., Lawrence, Mass., has been incorporated with a capital of $70,000, to manufacture polishes and kindred products. Alvin L. Hofmann is president; and Richard P. Fiedler, 40 Swan St., Methuen, Mass., treasurer.

THE NONPAREIL GELATOID PRODUCTS CO., New York, care of A. G. Scheer, 149 Broadway, representative, has been incorporated with a capital of $10,000, to manufacture imitation celluloid and other composition products. The incorporators are M. Hicks and J. A. Pierce.

THE J. M. STOEVER CO., Chester, Pa., is being organized under state laws to manufacture chemicals and chemical byproducts, extracts and kindred specialties. Application for a state charter will be made on July 17. The company is represented by Kingsley Montgomery, Law Bldg., Chester.

THE FARMERS' COTTON OIL MILL & GINNERIES CO., Shellman, Ala., has been incorporated with a capital of $50,000, to manufacture oil products. The incorporators are W. J. Oliver, J. M. Bell and W. R. Terry, all of Shellman.

THE STRATFORD RUBBER MFG. CO., 1736 South Michigan Ave., Chicago, Ill., has been organized under state laws to manufacture rubber products. The incorporators are Paul P. Harris, Fred W. Reinhardt and John A. Russell.

THE ACID RECOVERY CO., Brooklyn, N. Y., care of the United States Corporation Co., 65 Cedar St., New York, has been incorporated with a capital of $150,000, under Delaware laws, to manufacture acids and affiliated products. The incorporators are L. Lieberman, Walter K. Simonson, Brooklyn; and Otto Mantius, Englewood, N. J.

THE AMERICAN ASBESTOS MFG. CO., 336 Wayne St., Jersey City, N. J., has been incorporated with a capital of $50,000, to manufacture asbestos products. C. J. Skinner is one of the incorporators.

THE IRONIDE FOUNDRY, INC., Ware, Mass., has been incorporated with a capital of $50,000, to manufacture iron and other metal castings. Edward A. Johnson is president; and Stephen R. Jones, 220 North Main St., Brockton, Mass., treasurer.

THE BLUEBIRD OIL CO., Delmar (Albany County), N. Y., care of H. B. Casey, Albany, N. Y., representative, has been incorporated with a capital of $12,000, to manufacture oil products. The incorporators are J. O. Chamberlain, L. Arnold and E. C. Haswell.

THE COMBINED PRODUCERS OIL CORP., care of the Colonial Charter Co., Ford Bldg., Wilmington, Del., representative, has been incorporated under state laws with a capital of $3,000,000, to manufacture petroleum products.

THE FRENCH COMPACT PRODUCTS CORP. OF AMERICA, Providence, R. I., has been incorporated with a capital of $10,000, to manufacture composition products. The incorporators are E. R. and Charles Z. Alexander, and Francis A. Cullen, all of Cranston, R. I.

THE A. C. RUBBER CO., Elyria, Ohio, has been incorporated with a capital of $10,000, to manufacture rubber products. The incorporators are W. R. Huntington and J. W. Dewhurst, both of Elyria.

THE PIONEER PETROLEUM CORP. OF AMERICA, El Dorado, Ark., has been incorporated with a capital of $1,000,000, to manufacture petroleum products. The incorporators are James A. Clark, George Irving and L. C. Harper, all of El Dorado.

THE RENNIEBUT RUBBER CO., 8 Van Wagenen St., Newark, N. J., has filed notice of organization to manufacture rubber products. The company is headed by Charles H. Tisserand, 177 Broad St., Newark.

THE KITTANNING GREY BRICK CO., care of the Corporation Service Co., Equitable Bldg., Wilmington, Del., representative, has been incorporated under state laws with a capital of $100,000, to manufacture pressed brick and other burned clay products, with plant in Pennsylvania.

THE STANDARD CHEMICAL PRODUCTS CO., Hoboken, N. J., has been incorporated with a capital of $25,000, to manufacture chemicals and chemical byproducts. The incorporators are A. Lincoln Lavine, Henry Ruegg, Jr., and Louis L. Grombacher, 1021 Grand St., Hoboken.

THE SIMMONS INK CO., Indianapolis, Ind., has been incorporated with a capital of $5,000, to manufacture ink and kindred products. The incorporators are Richard Budlong, Paul Simmons and Earl Stansbury, all of Indianapolis.

THE AMERICAN ADAMITE CO., care of the Corporation Trust Co. of America, du Pont Bldg., Wilmington, Del., representative, has been incorporated under state laws, with capital of $1,000,000, to manufacture special steel products.

THE LIMESTONE FERTILIZER & BALLAST ROCK CORP., Golconda, Ill., has been incorporated with capital of $150,000, to manufacture fertilizers and affiliated products. The incorporators are John O. Kluge, Thomas H. Lackland, and John B. King, 1000 Peoria Life Bldg., Peoria, Ill.

THE SUNSET RUBBER CO., Everett, Wash., has been incorporated with a capital of $150,000, to manufacture automobile tires and other rubber products. The incorporators are C. E. Powley, W. C. Cloud and William Sheller, 326 Stokes Bldg., Everett.

THE MEADOW OIL CO., Newark, N. J., has been incorporated with a capital of $25,000, to manufacture oil products. The incorporators are Armond R. Schorner, Richard Betterman and George N. Aubertin, 196 Market St., Newark.

THE SOUTHERN & WESTERN GLASS PRODUCTS CO., care of the Corporation Service Co., Equitable Bldg., Wilmington, Del., has been incorporated under state laws with a capital of $2,500,000, to manufacture glass caskets and other glass products.

MARQUETTE & CO., INC., Haverhill, Mass., has been incorporated with a capital of $50,000, to operate a local tannery. George H. Marquette is president; and Oliver C. Frost, 66 Fountain St., Haverhill, treasurer.

THE WOOD COUNTY COTTON OIL CO., Mineola, Tex., has been incorporated with a capital of $56,000, to manufacture oil products. The incorporators are R. Bergfeld, W. W. Perry and H. W. Meredith, all of Mineola.

THE PYORHINE CHEMICAL CO., Seattle, Wash., has been incorporated with a capital of $40,000, to manufacture chemicals and chemical byproducts. The incorporators are David T. Lloyd and S. Ross Parker, 1603 Terry Ave., Seattle.

THE PLEASANTVILLE CONCRETE PRODUCTS CO., Pleasantville, N. J., has been incorporated with a capital of $50,000, to manufacture cement and concrete specialties. The incorporators are A. J. Milliken, Philip S. and Carlton Godfrey, 317 Guarantee Trust Bldg., Atlantic City, N. J.

THE HANDY GLASS CO., Philadelphia, Pa., care of the Corporation Guarantee & Trust Co., Land Title Bldg., has been incorporated under Delaware laws, with a capital of $200,000, to manufacture glass products.

THE CAPITAL FIBRE CORP., care of the Corporation Service Co., Equitable Bldg., Wilmington, Del., has been incorporated under state laws, with capital of $2,000,000, to manufacture fiber products.

THE ERNFINE TRADING CORP., New York, N. Y., care of Latson & Tamblyn, 66 Broadway, representatives, has been incorporated with a capital of $75,000, to manufacture fire prevention chemicals. The incorporators are W. N. Wilkinson, J. T. Barry and W. N. Wilkinson.

THE TROGIN PRODUCTS CO., 244 Wayne St., Jersey City, N. J., has filed notice of organization to manufacture chemicals and chemical byproducts, drugs and kindred products. The company is headed by H. George Tilleman and L. A. Sista.

THE CLAYTON OIL & REFINING CO., care of the Corporation Trust Co. of America, du Pont Bldg., Wilmington, Del., representative, has been incorporated under state laws with a capital of $850,000, to manufacture refined petroleum products.

THE PAN AMERICAN SOAP CO., Brooklyn, N. Y., care of Louis Horwitz, 772 Broadway, Brooklyn, representative, has been incorporated with a capital of $5,000, to manufacture soaps and kindred products. The incorporators are B. Gerber, M. Klaits and E. Schneider.

THE CENTURY CHEMISTS, INC., Room 1224, 202 South State St., Chicago, Ill., has been incorporated with a nominal capital of $1,500, to manufacture chemical specialties and preparations. The incorporators are F. King, P. Stolz and H. H. Sharpe.

THE KY-IND-O OIL CORP., Lexington, Ky., has been incorporated with a capital of $100,000, to manufacture petroleum products. The incorporators are S. G. Smelser and George N. Snyder, both of Richmond, Ind., and Z. O. Avry, Lexington.

THE MINEOLA TILE MFG. CO., Mineola, L. I., care of Seabury, Seaman & Gehrig, Hempstead, L. I., representatives, has been incorporated with a capital of $50,000, to manufacture tile and other ceramic products. The incorporators are E. Schmidt, A. A. Lein and E. J. Armstrong.

THE VITROLITE PRODUCTS CO., 218 North Union Ave., Chicago, Ill., has been incorporated with a capital of $100,000, to manufacture composition products. The incorporators are F. J. and Thomas C. Downs, and J. F. Hardin.

THE SIX MEDALS CHEMICAL CO., New York, N. Y., care of J. M. Frost, 174 Rivington St., representative, has been incorporated with a capital of $20,000, to manufacture chemicals and chemical byproducts. The incorporators are H. Kaufman and L. Perlstein.

THE P. T. L. MFG. CO., 219 Ave. E, Bayonne, N. J., has filed notice of organization to manufacture chemical specialties,

disinfectants, etc. Isadore Hollender heads the company.

THE BLOOD RIVER OIL CO., care of the Delaware Registration Trust Co., 900 Market St., Wilmington, Del., representative, has been incorporated with a capital of $300,000, under state laws, to manufacture petroleum products.

THE OTIS-GRAY CO., 208 South La Salle St., Chicago, Ill., has been incorporated with a capital of $25,000, to manufacture petroleum and other oil products. The incorporators are L. L. Losey, Max Haleff and D. D. Stansbury.

THE MARYLAND CALCITE CO., Texas, Md., has been incorporated with a capital of $100,000, to manufacture lime and affiliated products. The incorporators are Raymond L. Lovell, Richard E. Tome and Palmer R. Nickerson, all of Texas, Md.

THE AMALGAMATED PETROLEUM & REFINING CO., New York, N. Y., care of Leonard E. Wales, Wilmington, Del., representative, has been incorporated under Delaware laws with capital of $1,500,000, to manufacture refined petroleum products. The incorporators are Martin V. McTuigg, Arthur W. White and George L. Barney, New York.

THE LANE RUBBER CO., INC., Norwich, Conn., has been incorporated with a capital of $50,000, to manufacture rubber products. The incorporators are George E. Hall, R. E. and C. E. Lane, 46 Hamilton Ave., Norwich.

THE ALBEMARLE SOAPSTONE CO., Esmont, Va., has been incorporated with a capital of $150,000, to manufacture commercial soapstone products. H. P. McCary is president; and E. W. Scott, Jr., secretary, both of Esmont.

THE NORTHWEST REFINING CO., care of the Corporation Service Co., Equitable Bldg., Wilmington, Del., representative, has been incorporated with a capital of $1,300,000 under Delaware laws, to manufacture petroleum products.

THE SWANSON OIL CORP., East Peoria, Ill., care of William J. Peck, Jefferson Bldg., Peoria, Ill., representative, has been incorporated with a capital of $25,000, to manufacture refined oil products. The incorporators are Otto B. and Edward A. Swanson, and Oakley Mariott.

Industrial Developments

RUBBER—The B. F. Goodrich Co., Akron, O., has advanced production from 18,000 to 22,000 tires a day at its local plant.

All tire-manufacturing plants at Columbus, O., have been placed on a capacity basis, under two-shift operation.

The Goodyear Tire & Rubber Co., Akron, O., has increased production to a maximum of 32,000 tires a day at its Akron, O., California and Canadian plants; the output of the first noted factory is now rated at 26,000 tires daily.

The Republic Rubber Corp., Youngstown, O., has increased production from 1,500 to 1,800 tires a day at its local plant. The mechanical rubber goods department is running full, and orders in this branch are said to be in excess of output.

The Firestone Tire & Rubber Co., Akron, O., has advanced operations to a maximum of 25,000 tires a day at its local plant.

The rubber specialty departments of mills at Akron, O., have developed the heaviest production during the past few weeks than evidenced for more than a year past. A number of plants are working an extra night shift.

The Continental Rubber Co., Torreon, Mex., is curtailing operations at its local plant owing to the unsatisfactory labor conditions in this district and the low price of crude material.

The Miller Rubber Co., Akron, O., has increased manufacture from 6,500 to 7,500 tires per day.

CERAMIC—Clay products plants at Irondale, near Salineville, O., are increasing production and making additions to their working forces. The McClane Fire Brick Co. is operating both of its local plants at capacity; the Benfield Clay Co. has advanced production to 100 per cent, giving employment to about 75 men; the East Ohio Sewer Pipe Co. is running full at its No. 2 plant, giving work to a regular quota. The No. 1 plant of the last noted company is still idle, but is expected to resume in the near future.

All brick-manufacturing plants in Texas are running at maximum capacity, according to a report made at the recent annual meeting of the Texas Brick Manufacturers' Association, and the present year is expected to be the greatest in the highest of the state industry.

IRON AND STEEL—The Bon Air Coal & Iron Corp., Nashville, Tenn., has resumed operations at its Goodrich blast furnace, following a suspension since November, 1920. It is planned to develop capacity at an early date.

The Crucible Steel Co., Pittsburgh, Pa., is running at from 70 to 80 per cent of capacity at its different plants. Each month is showing an improvement over the previous one, it is stated.

The United Alloy Steel Co., Canton, O., is operating at capacity at its heat-treating department and cold-drawing mills. All bar mills are in service, and production is being advanced in the open-hearth department. The company is said to have orders on hand for at least two months' maximum capacity.

The Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., is planning to blow in its No. 4 stack at Bessemer, Ala., at an early date. It will produce foundry pig iron.

The Sharon Steel Hoop Co., Youngstown, O., will blow in its blast furnace at Lowellville, O., at once, making the sixth unit to be placed in service by the company since the commencement of the coal strike. The Lowellville furnace will be used for supplying the local mills.

The Robesonia Iron Co., Robesonia, Pa., has placed its recently relined furnace in blast, following an idleness of several months. Employment will be given to about 150 men, with the unit operating on a basis of 250 tons per day. An advance of 10 per cent has been made in wages at the plant.

The Midvale Steel & Ordnance Co., Philadelphia, Pa., is now operating at about 75 per cent of normal at its plants.

Mudge & Co., operating a blast furnace at Sharpsville, Pa., has increased the capacity of the plant to about 400 tons a day. Four hot blasts are now being added.

The Republic Iron & Steel Co., Youngstown, O., is planning to light another furnace at an early date for the production of Bessemer iron. Closely following, it is expected to resume at the steel-making mills, which have been idle for a number of months.

The Eastern Steel Co., Pottsville, Pa., is resuming operations in all departments of its plant, with the exception of the open-hearth furnaces. The plant has been on a curtailed basis for the past 18 months.

The Charcoal Iron Co. of America, Ashland, Wis., is resuming operations at three of its four plants, including the local mills and works at Newberry and Manistique, Mich. The Ashland plant has been improved and extended, and a new 175-ft. stack built. It will run on pig iron- charcoal, alcohol and byproducts, giving employment to about 600 men. The blast furnace department will engage a quota of 150 operatives. The plant of the company at Boyne City, Mich., is still shut down, and is not expected to resume until later in the year.

METALS—The Shasta Zinc & Copper Co. has resumed operations at its plant at Winthrop, Cal., giving employment to about 200 men. As soon as conditions warrant, operations will be advanced to maximum, totaling close to 300,000 lb. of copper, and 2,000,000 lb. of zinc oxide per month.

The Canada Copper Corp. is considering the resumption of production at its plant at Princeton, B. C., early in August. The mill has a capacity of about 2,000 tons a day.

The Eureka Metallurgical Co., Salt Lake City, Utah, is completing a new test mill on site south of the city, and plans to place the unit in service at an early date.

The International Smelting Co., Salt Lake City, Utah, has resumed operations at its Utah plant, following a suspension for more than a year past. One of the copper reverberatory furnaces has been blown in, to operate with a daily capacity of approximately 300 tons. A number of lead furnaces will be placed in service, to develop an output of 400 tons a day of lead ores and concentrates.

MISCELLANEOUS—The Pennsylvania Glass Sand Co. has resumed operations at its Dawson Works, Vineyard, Pa., following a suspension for a number of months.

The Lehigh Portland Cement Co., New Castle, Pa., has placed its three local mills on a capacity basis, giving employment to an increased working force.

The Atlas Portland Cement Co. is maintaining operations at its large mill at Northampton, Pa.

The General Leather Co., Newark, N. J., specializing in automobile leathers, will soon commence production in its new local plant, which has been in course of construction for some time past. The structure forms a complete duplicate plant unit, and is expected to double the output.

Capital Increases, Etc.

THE COMMERCIAL SOLVENTS CORP., Terre Haute,, Ind., manufacturer of alcohol solvents, etc., is disposing of a stock issue of $1,800,000, the proceeds to be used for general expansion. P. G. Mumford is president.

THE CHICAGO BRICK CO., 38 South Dearborn St., Chicago, Ill., has filed notice of increase in capital from $10,000 to $250,000, for expansion.

THE SANIWAX PAPER CO., Kalamazoo, Mich., has filed notice of increase in capital from $20,000 to $215,000, for general expansion.

THE RACINE HORSESHOE TIRE CO., Racine, Wis., manufacturer of automobile tires, etc., is disposing of a bond issue of $300,000, the proceeds to be used for general expansion. J. B. Lawrence is president.

THE INDEPENDENT PAPER MILLS, INC., 68 35th St., Brooklyn, N. Y., has filed notice of increase in capital from $50,000 to $100,000.

THE UNITED GLUE CO., Indianapolis, Ind., has filed notice of dissolution under state laws.

THE WHITTEMORE GLASS CO., Dunbar, W. Va., manufacturer of window glass, is arranging for an increase in capital to $500,000, for general expansion. A. P. Whittemore is president.

Grayson Stetson has been appointed receiver for the TEMPLER LEATHER CO., Salem, Mass.

THE COLLOIDAL PROCESS PAINT CO., Baltimore, Md., has arranged for an increase in capital of $100,000, the proceeds to be used for general expansion, at the same time filing notice of change of name to the National Bitumens Corp.

THE MISSOURI PORTLAND CEMENT CO., St. Louis, Mo., has arranged for a bond issue of $2,000,000, a portion of the proceeds to be used for expansion.

THE LION OIL & REFINING CO., Kansas City, Mo., has filed notice of increase in capital from $450,000 to $750,000.

THE FIRESTONE TIRE & RUBBER CO. OF CANADA, LTD., Hamilton, Ont., a subsidiary of the Firestone Tire & Rubber Co., Akron, O., is disposing of a bond issue of $1,500,000, a portion of the proceeds to be used in connection with the erection of a new local plant, general operations, etc.

THE CENTRAL SHALE OIL CORP., Highland Blvd., Pittsburgh, Pa., has filed notice of increase in capital from $1,000,000 to $1,500,000.

THE WAUKEGAN CHEMICAL CO., Waukegan, Ill., has filed notice of increase in capital from $10,000 to $25,000, for general expansion.

The foundry and property of the EMERY STEEL CASTINGS CO., South Charles and Hanover Sts., Baltimore, Md., will be sold by Albert R. Stuart, trustee in bankruptcy.

THE MESABI IRON CO., 25 Broad St., New York, N. Y., a Delaware corporation, has filed notice of increase in capital from $53,000,000 to $103,000,000, for general expansion.

THE LION TIRE & RUBBER CORP., Lafayette, Ind., has filed notice of increase in capital from $500,000 to $700,000, for general expansio.n.

Coming Meetings and Events

AMERICAN CERAMIC SOCIETY will hold a summer excursion meeting to Rochester, Montreal, Ottawa, Kingston, Toronto, Hamilton, Niagara Falls and Buffalo, Aug. 13-19.

AMERICAN CHEMICAL SOCIETY will hold its fall meeting in Pittsburgh, Pa., Sept. 5 to 9.

AMERICAN ELECTROCHEMICAL SOCIETY will hold its fall meeting in Montreal, Sept. 21, 22 and 23. Headquarters will be at the Windsor Hotel.

AMERICAN SOCIETY FOR STEEL TREATING will hold its International Steel Exposition and Convention in the General Motors Bldg., Detroit, Mich., Oct. 2 to 7.

ANNUAL SAFETY CONGRESS OF THE NATIONAL SAFETY COUNCIL will be held in Detroit, Mich., Aug. 29-Sept. 2.

NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES (EIGHTH) will be held in New York Sept. 11-16.

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING will be held at the Grand Central Palace Dec. 7-13, with the exception of the intervening Sunday.

NEW JERSEY CHEMICAL SOCIETY has discontinued meetings for the summer, but will resume them in October.